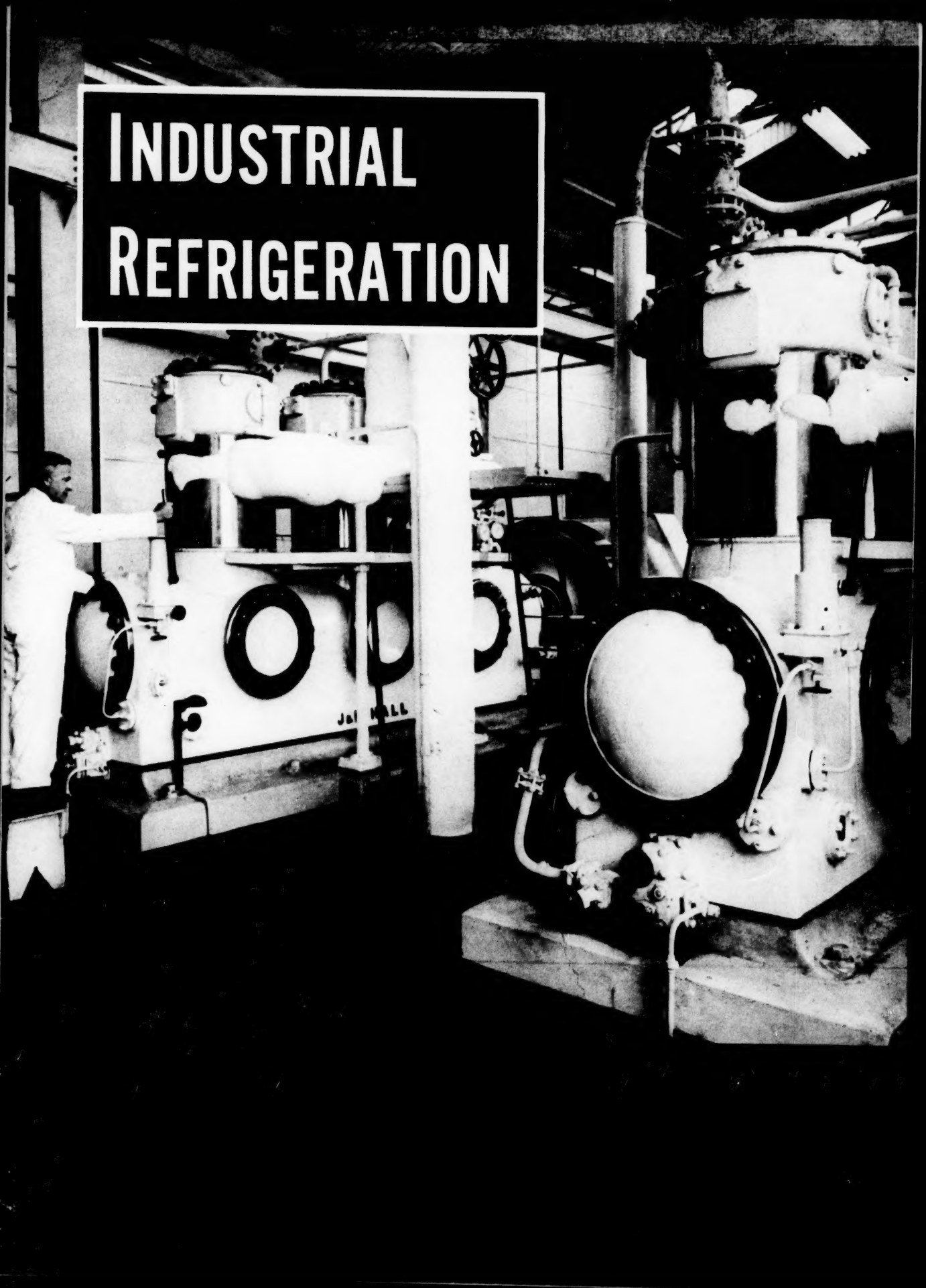
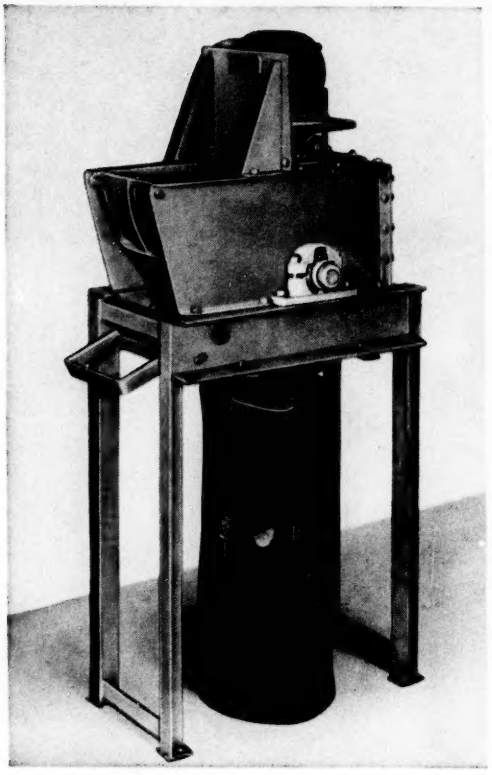

INDUSTRIAL
REFRIGERATION



Breaking Ice

is an easy proposition

with a GIFFORD-WOOD Type 540-L ICE BREAKER

A flip of the switch delivers all the crushed ice you need—up to ten tons per hour—directly into 25- or 50-lb. paper bags, or 100-lb. metal-bottom bags. Uniform size ice chips too. A handy manual adjustment at the front of the breaker easily sets the comb adjustment to crush ice in any one of three chip sizes, as desired.

The stand is stationary, but bagging spouts for tall or short bags are available at slight cost—a feature that completely eliminates shovelling.

Here is one of the most practical, efficient breakers ever designed, another *engineered* result of Gifford-Wood's more than 138 years of experience in the industry. It's made with the same strong, welded-steel construction that has made the G-W 540 a favorite for years.

Want more facts? Write today!
For full information on all G-W Ice Breakers ask for Bulletin 482.

SPECIFICATIONS

Capacity	6 to 10 tons/hour
Hopper Opening	12½" wide x 14¼"
Floor Space Required	24" x 34"
Height to Hopper Edge	4' x 8½"
3 comb adjustment: fine-medium-coarse with fine and coarse comb.	Product average ⅝" on fine up to 3" coarse.
Drive: 1-HP Motor with V Belt and chain drive.	
Electric Current	3 ph. 60 cy. 220 Volts
Shipping Weight	Approx. 700#

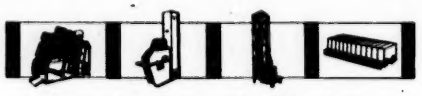
GIFFORD-WOOD CO.

Since 1814
Hudson, New York

New York 17
420 Lexington Avenue

St. Louis 1
Railway Exchange Building

Chicago 6
565 West Washington Street



Cuber Breaker-Elevator Tiering Machine Conveyor

6848

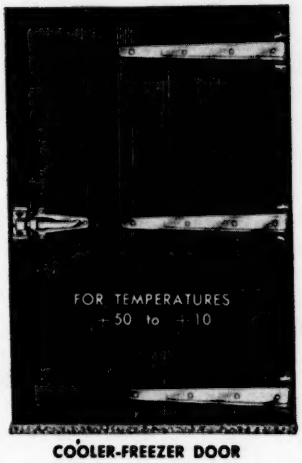
"Butcher Boy"

REFRIGERATOR DOOR CO.

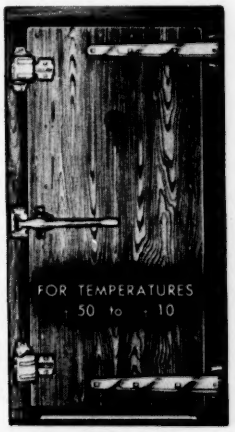
STRONGEST
MOST DURABLE
ONLY 100% MODERN

REFRIGERATOR DOORS
BUILT IN THE WORLD

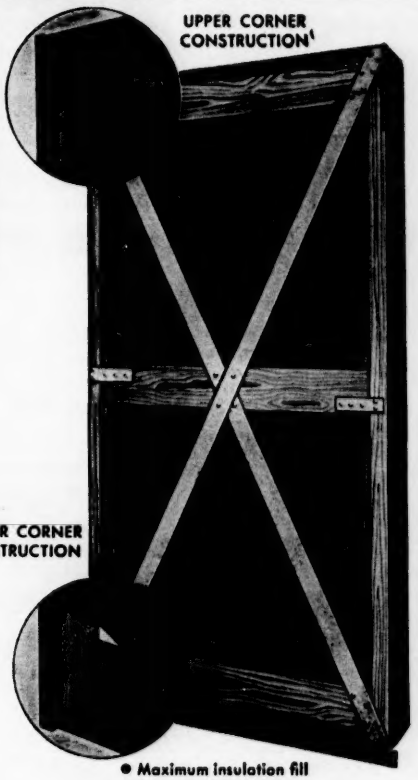
NEW "X-TYPE" DOORS
FEATURING "X-TYPE" STEEL DIAGONAL BRACING



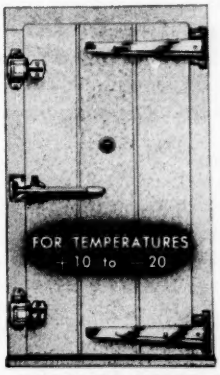
COOLER-FREEZER DOOR
- Modern streamlined job
- 100% "Douglas Fir"
- Sanitary hardware



X-52 PLYWOOD PANEL DOOR
- Plywood front and back
- Extra heavy-duty hardware
- Special type gaskets

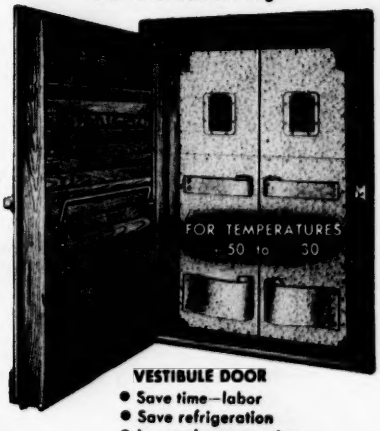


- Maximum insulation fill
- Most possible rigidity
- Allows reversal of swing



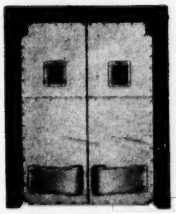
LOW TEMPERATURE DOOR
- Entire metal-clad front
- Extra heavy-duty hardware
- Special type gaskets

SUPER FREEZER (OVER-LAP) DOOR
- Extra-heavy construction
- Extra-heavy duty gaskets
- Extra heavy-duty hardware

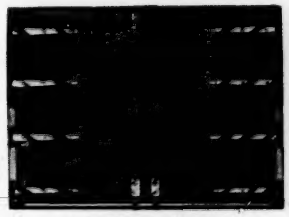


VESTIBULE DOOR
- Save time—labor
- Save refrigeration
- Large plant operation

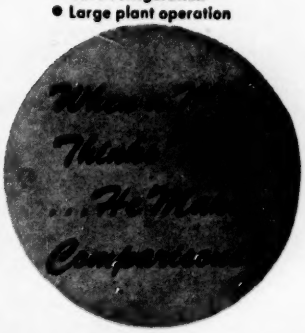
TRACK DOOR
- For abattoirs
- Meat handling rails
- Banana rooms



AUTO-CLOSE DOOR
- For loading dock
- Intra-cooler doors
- Heavy trucking



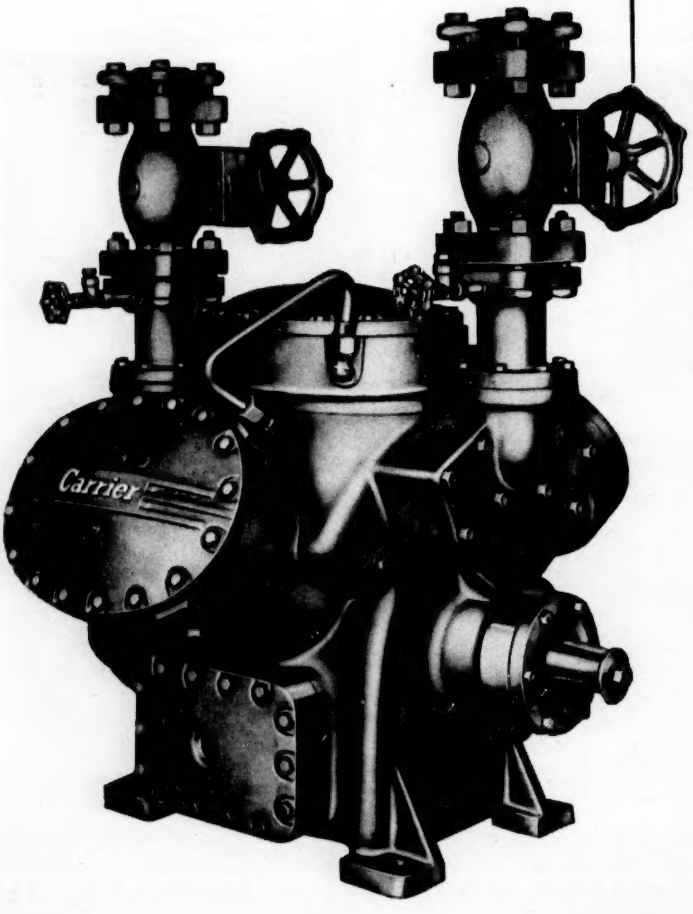
DOUBLE DOOR
- For palletizing
- For carloading
- For elevator shafts

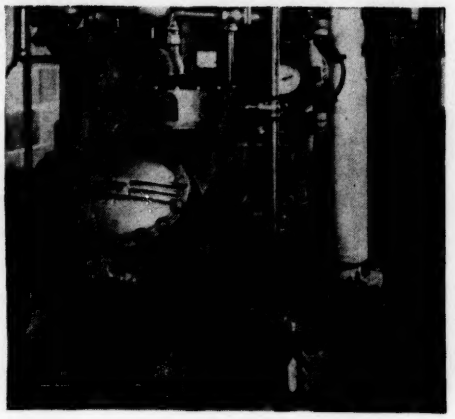


BUTCHER BOY REFRIGERATOR DOOR CO. • HARVARD, ILL.

EXPERTS LIKE TO DO BUSINESS WITH EXPERTS

FOX DE LUXE FOODS CHOOSE CARRIER AMMONIA REFRIGERATION





Experts at food processing, Fox De Luxe Foods, Inc., called on Carrier's experts to triple the freezing capacity of their Watertown, S. D., plant. Carrier engineers designed a system that used the Fox plant's original equipment, and added a Carrier ammonia booster compressor (illustrated), interstage cooling, and two cold diffusers. Output was increased from 12,000 to 40,000 pounds of frozen foods a day—at a minimum cost!

Carrier ammonia refrigerating equipment is on the job in food processing plants, large and small, all over the world — serving companies like Dole Pineapple, Honolulu; Rath Packing Company, Waterloo, Iowa; United States Cold Storage Corporation, Omaha, Nebraska; Merchants Refrigerating Company, Hopkins, Minn.

May we assist *you?*

Whether you need a complete ammonia refrigerating system or a single machine, bring your problem to Carrier's experts. Call on your nearest Carrier office. Or write direct to Carrier Corporation, Syracuse, New York.

Carrier

ammonia refrigerating systems

LETTERS

(Letters to the editor are welcomed from readers of INDUSTRIAL REFRIGERATION on any subject of general interest.)

Readers Commend "Build or Rent" Article

Colorado Springs, Colo.

You certainly deserve very favorable commendation for the conservative and thoughtful way in which you discuss the question of whether "To Build or Rent Storage Space." (January INDUSTRIAL REFRIGERATION). I read the article with much interest and a feeling that you have done the refrigerated warehousing industry, processors of foods and the American public a real service in setting the facts so ably before them. Well done.

H. C. DIEHL
Director, Refrigeration
Research Foundation

Expert Presentation

Chicago, Illinois.

We are very much impressed with your article about our new cold storage warehouse which appeared in your March issue. You presented to INDUSTRIAL REFRIGERATION readers a very complete and most factual report of the many special features incorporated in the design of the Produce Terminal Annex, while at the same time, providing a detailed description of the facilities. Indeed, your very expert presentation pleased us and prompted this line to show our appreciation for a job well done.

WM. C. BAKER, vice-president
Produce Terminal Cold
Storage Co.

Another Bouquet for I.R.

Andover, Mass.

We have seen a recent copy of your publication entitled INDUSTRIAL REFRIGERATION and think that it is a fine magazine. Would you be so kind as to notify us regarding subscription rates?"

R. L. MEARS
Refrigeration Equipment
& Service Inc.

Article Brings Inquiry

Cleveland, Ohio

Thank you for the article on the indoor ice rink at Butte, Mont., in your February issue. As a result we have an immediate inquiry from a municipality planning to build an auditorium this year.

E. R. CARPENTER
Cleveland, Ohio

Industrial Refrigeration

formerly ICE AND REFRIGERATION

Now in its 62nd Year of Publication

J. F. NICKERSON, FOUNDER

VOL 126 APRIL, 1954 NUMBER 4

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The Cover:

Compressor room, export wharf cold stores, of the Auckland Farmers Freezing Company Ltd., Auckland, New Zealand. Shown are two 400 hp 273 rpm 3-cyl. 16½ inch dia. x 12 inch J. & E. Hall Ammonia Compressors. The two machines in the foreground are in operation while a third (not pictured), a 240 hp 360 rpm 3-cyl. 10½ x 9 inch Sterne, is standby. *See story on page 30.*

Published Monthly by NICKERSON & COLLINS CO.

General Offices: 433 N. Waller Ave., Chicago 44, Ill. Telephones: Austin 7-1303-04-05

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INDUSTRIAL REFRIGERATION, Vol. 126, No. 4. Published monthly at 433 N. Waller Ave., Chicago, Ill., U.S.A., by Nickerson & Collins Co. Yearly subscription in the U. S., $2.00 per year; other countries, $3.00. Single copies, 25 cents.

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Industrial Refrigeration is indexed regularly by Engineering Index, Inc., and is microfilmed for library use by University Microfilms.

What's New

MACHINERY
APPLIANCES • PROCESSES

For your convenience in securing additional information on any product desired, write the Readers Service Department.

New Tin-Lead Solder

A PASTE-TYPE 50-50 tin-lead solder recently placed on the market by the Hercules Chemical Co., Inc., New York, N. Y. will be of interest to air conditioning contractors and other industrial users. Packaged under the name of Hercules Swif solder, it has been developed primarily to speed sweat soldering and tinning operations. It is said to save time over conventional solders since it cleans, tins and sweats in one operation.

The regular 1 lb. package of Swif solder, and the 3 oz. trial size. Below, typical completed sweat joint made with Swif solder.

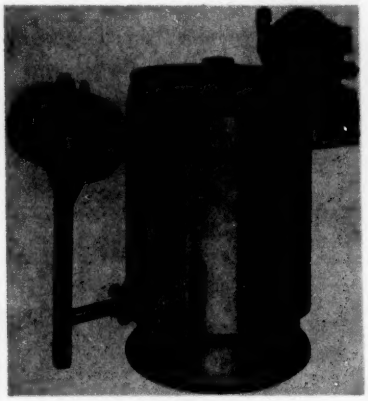
The flux in Swif solder not only chemically cleans the surfaces to be soldered or tinned, but also allows the solder to flow freely to form a secure bond. The pre-cleaning and pre-heating necessary with other types of solder is entirely eliminated with Swif solder; separate application of flux is also eliminated. Swif solder is simply brushed on, heated, and the job is complete.

Joints and tinned surfaces made with Swif solder perform at least as well and last as long as those prepared with other forms of 50-50 solder. A leading independent laboratory reports that Swif solder withstands pull of 2,000 lbs. on ½ inch copper sweat joints. The same laboratory, in a hydrostatic pressure test, prepared several ½ inch sweat joints with Swif solder. At a pressure of 3,600 psi, the tube burst, but Swif soldered joints were not affected. Hercules Swif solder is packaged in 3 oz. trial size ½ lb., 1 lb. and 3 lb. containers.

New Large Capacity Flake Ice Machine

A NEW ice machine for flaked ice with new engineering features that are said to contribute to a simple design, efficient operation and sturdy construction, for dependable, maintenance-free service, has been announced by Burge Ice Machine Company, Chicago, Ill.

Operation is fully automatic, the ice starting almost immediately. Designed for simple, fool-proof operation. Built to give uninterrupted 24 hour service and to produce flaked ice as low as $1.50 to $2.00 per ton. Production cost limited to ice used.



The New Burge Flake Ice Machine

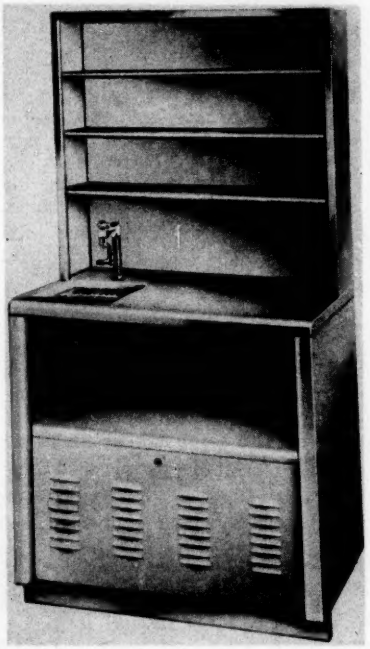
Construction: Flooded type refrigeration system; One motor only operates harvester and water pump; Welding in accordance with A.S.M.E. code; Inside ice making surface heavily chromium plated; Cylinders are heavily insulated with corkboard and aluminum or stainless steel jacket; Single motor operates cutting knives and water pump; Ice cutting knives on shaft operate at less than 1½ revolutions per minute, depending on quantity of ice required; Refrigeration joints are accessible on exterior of unit. No packing glands or stuffing boxes to develop leaks; Occupies less space than the storage bin.

It is available in three models: Model B340—3 to 4 tons; B560—5 to 6 tons; B1012—10 to 12 tons.

Plans are to market this machine through established refrigeration contractors.

Refrigerated Water Cooler

REMOTE or self-contained refrigerated water coolers by Dunhill are constructed of 20 gauge stainless steel. They are equipped with filler glass faucet and instantaneous water cooler. Illustrated is Dunhill's Model



Dunhill's Model RWC-3 self contained water cooler.

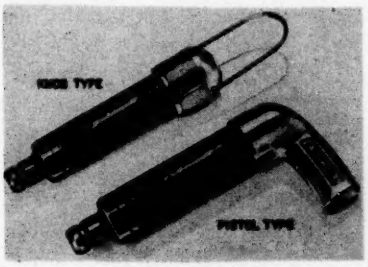
RWC-3 self-contained cooler. Remote models have additional stainless steel shelves in place of the louvered panel that conceals the condensing unit. Dimensions are 36 inches long, 24 inches deep, 72 inches high. Working height is 36 inches.

Canister-Type Gas Masks

A NEW bulletin illustrating and describing canister-type gas masks has been released by Acme Protection Equipment Co., Chicago, according to G. M. Glidden, general manager. For the benefit of companies that encounter hazardous gas conditions, emphasis has been placed on clarifying the proper application of this type of protection. The bulletin covers such subjects as canister construction, canister life, methods of determining gas concentrations, heating and humidity, deficiency of oxygen, and presents data on recommended equipment for specific hazards in fire-fighting, industrial, agricultural and chemical fields. Included are specifications on Acme canisters and a unique illustrated table of mask equipment showing the proper parts required for each individual application.

Pneumatic Hammers

A NEW air tool for drilling, chipping, trimming, scaling, sealing and all around general applications is announced by The Burgess Thomas Company, Bloomfield, N. J. national distributors for Caldwell Hammers.



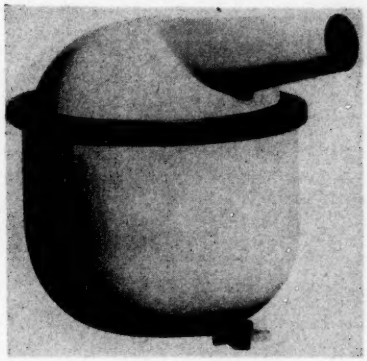
The Caldwell pneumatic hammer showing knob and pistol type handle.

This hammer is small in size measuring 9¾ inches overall length with a 1⅝ inch barrel diameter. For flexibility the hammer is offered in two handle styles, the pistol type and the knob type as illustrated. The Caldwell is automatic in that it operates when pressed into contact with the work and stops when withdrawn. Its light weight, (approximately 5 pounds), combined with the automatic start-stop action and no recoil "kick" make for safe, easy handling.

Tools are readily inserted, held firmly and removed by hand, from the push-pull quick change chuck of the Caldwell hammer. This powerful, compact tool uses very little air and operates on pressures from 30 to 100 pounds in accordance with the requirements of the work.

Egg-Storage Humidifier

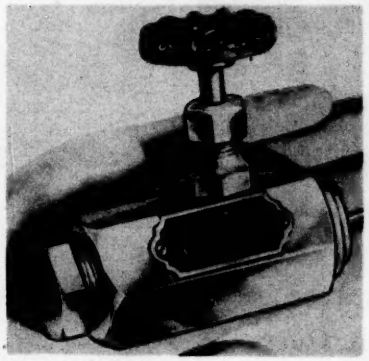
THE manufacture of a new Model LD, Commercial humidifier which has been designed and priced for Egg Holding Rooms, at the producer's level is announced by Walton Laboratories, Inc., Irvington, N. J. This new humidifier is designed to humidify up to approximately 1000 cubic feet. Hooked up to city water supply and humidistat control, it is completely automatic. The method of distribution will in most cases, be through poultry supply dealers and distributors.



New Walton Egg-Storage Humidifier

Pulsation Dampener

AN IMPROVED pulsation dampener to be installed on gauge and governor lines has been developed by J. A. Campbell Company, Long Beach, Calif. Known as the Micro-Bean, the device has been redesigned to a shorter length and equipped with a filter of stainless steel to prevent corrosion. The body is all brass for 3000 lb operating pressure, or steel with stainless steel micro-valve for 6000 lb or all stainless steel for 10,000 lb. The Micro-Bean's valve has a 96 to 1 taper to eliminate stem and screw compression strain. When installed ahead of a gauge or governor, jitters of the gauge pointer are minimized, pulsation is dampened and the line flow is smoothed. The device is now made with both female threads, ¼ inch or ½ inch.

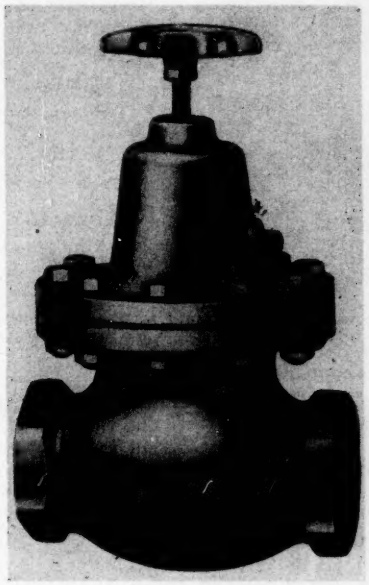


Improved Pulsation Dampener

New Automatic Control Valve

A NEW type KD automatic back pressure control valve series is announced by A. W. Cash Valve Manufacturing Co., Decatur, Ill. These new valves automatically maintain a constant back pressure on the inlet side, regardless of variation of pressure at the valve outlet, and regardless of changes in demand or flow.

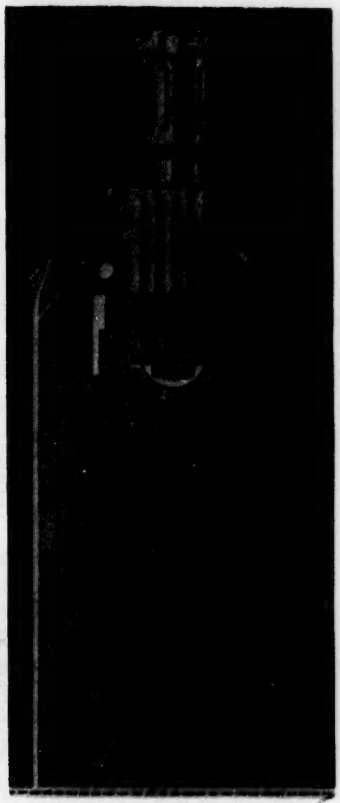
Although designed primarily for refrigeration use, these new valves have already found applications in other fields in which back pressure valves are required, and which call for unusually high capacity. The Type KD Valves give high capacity because of the multiple ported seat arrangement. They are available in pipe sizes ranging from ½ to 2 inches, screwed ends, and with or without a hand wheel for manual pressure adjustment.



Type KD automatic back pressure control valve equipped with hand wheel.

New Device Detects Ammonia Leaks

A NEW pocket-size device for detecting ammonia leaks was announced by Nitrogen Division, Allied Chemical & Dye Corporation. The device consists of "Sulfstix", or long-sulphur-impregnated tapers in a container designed to be carried in a pocket or hung on the wall near ammonia equipment. Ammonia leaks can be detected by lighting a taper and holding it near equipment suspected of leaking. A white cloud will indicate the point of ammonia leakage. The tapers may be extinguished and reused. The "Sulfstix" device may be obtained free of charge by writing Nitrogen Division, Allied Chemical & Dye Corporation, 40 Rector Street, New York 6, New York.



Ammonia Leak Detector

THERMOBANK
FOR
Ammonia
by KRAMER

THERMOBANK
the defrosting system that makes Ammonia SHINE!

LUCERNE MILK COMPANY, of Los Angeles, Calif., modernized with KRAMER AMMONIA THERMOBANK automatic defrosting system to end years of expensive manual defrosting.

"BEFORE" photo shows iced condition of the old overhead coils.

"AFTER" photo, same room, modernized with KRAMER Ammonia THERMOBANK at minus 25° F; 6400 gallons hardened daily.

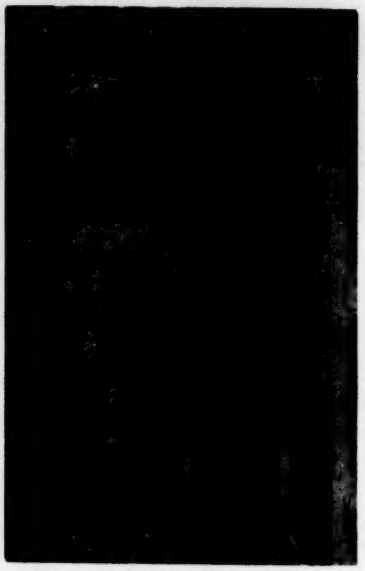
INSTALLED BY ASSOCIATED REFRIGERATING ENGINEERS, LOS ANGELES, CALIFORNIA.

WRITE NOW FOR BULLETIN TA-182

KRAMER TRENTON CO.
Trenton 5, N.J.

Mechanical Temperature Control Unit For Refrigerator Car

TWO or three years ago, Santa Fe Railways equipped a refrigerated car with a mechanical temperature control unit. This prototype unit was to be used in testing the idea that a refrigerator car could be equipped with its own refrigeration unit and operate unattended from California to Chicago. In addition, it was believed that the mechanical unit would aid in solving the problem of transporting frozen foods.



View of Hercules Diesel Engine which drives the compressor on Santa Fe new temperature controlled refrigerator car. (Santa Fe Railway Photo)

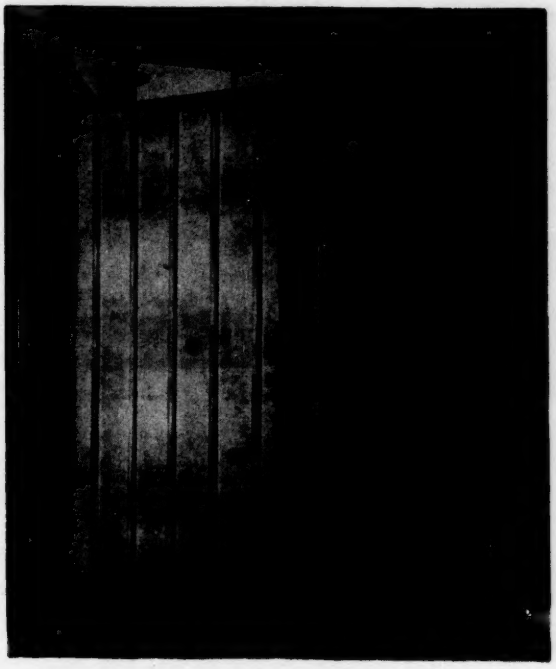
This original test unit was powered by the Hercules Diesel engine, 6 cylinder, 4 cycle, 298 cu. in. piston displacement, 52 hp at 1200 rpm. The engine is connected to a 25 kw, 220 volt, 3 phase, 60 cycle alternator.

Exhaustive tests were conducted by the Santa Fe. The Hercules engine operated satisfactory during a test of 1500 hours (over two months—night and day). The longest continual run was 267 hours which is equal to better than 11 days. This test of the Hercules Diesel engine and the refrigeration equipment pointed out to the Santa Fe officials that their idea of mechanical temperature control was practical and that it could be applied to road service.

Plastics Insulate Refrigerated Trucks

The use of Fiberglass reinforced plastics has been adapted by The Strick Company, Philadelphia, Pa., for insulating refrigerated truck trailers for handling frozen foods. Of special importance are structural plastic doors and liners. The door lining is of one piece. Assuring that door does not warp. Plastic sheets forming the inner wall of the trailer provides insulation against heat loss. These sheets are not affected by water or water vapor and the interior can be hosed out and steamed out without deterioration. With this material, it is claimed, there is no warping, expanding, contracting, absorbing of moisture, transfer of odors or temperature leaks.

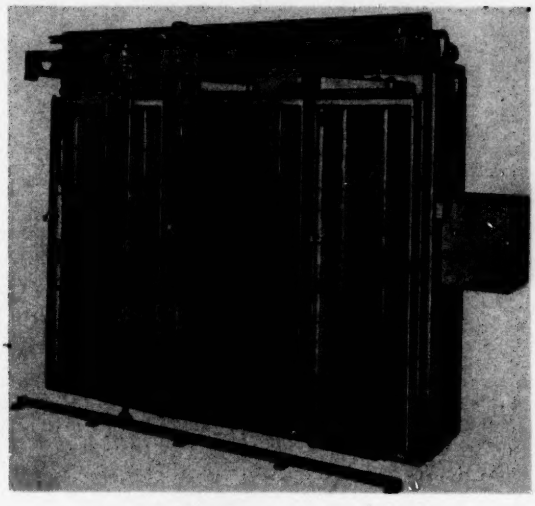
Corrugated construction allows air to circulate around the cargo, thus eliminating hot spots. The plastic interior with its integrally molded spacers is said to be much stronger than plywood or light gage metal sheets. In addition to being stronger it has an elastic quality. It has resistance comparable to that of stainless steel but is much lighter and has another advantage in that it is inherently an insulating material.



Plastic door and cutaway view showing insulation in truck trailer.

New Electro Cell Electronic Precipitator

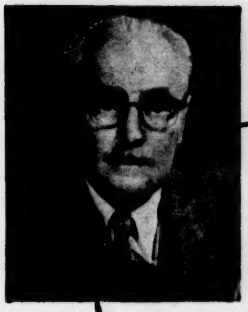
THE Electro-Cell electronic precipitator has been redesigned by American Air Filter Co., Louisville, Ky., to provide semi-automatic reconditioning of the collector plates. The recently developed Type H washer washes the collector plates with water sprays and recoats them with a dust holding adhesive. The entire operation is automatic after a starting button is pushed.



Electro Cell Electronic Precipitator

The washer consists of a vertical header attached to a carriage that travels on an overhead trackway extending the full width of the Electro-Cell. The header comprises separate water and oil lines with uniformly spaced nozzles. The assembly moves across the precipitator twice on the washing cycle and, after a five minute drying period, sprays the collector plates with adhesive.

The flat spray nozzles are placed at a 5 degree angle to the vertical plane of the collector plates thus insuring thorough penetration of the plate assembly.



check why my company insists on YORK valves and fittings!

☑ You can depend on a York Valve...every York Valve is triple inspected and double tested under water at 300 lbs. pressure for overall tightness, seat tightness and sealing ring tightness.

☑ York offers the industry's most complete line of Freon and Ammonia Valves... from ¼" to 14".

☑ York Valves and Fittings are immediately available from a York Office, or a York Authorized Jobber.

Join the long, long list of satisfied York customers. More than half a million condensing units and compressors rely on York Accessories and Supplies for dependable performance.

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HEADQUARTERS FOR MECHANICAL COOLING SINCE 1885

Hold Over Refrigerated Cabinet for Trucks

A HOLD-OVER refrigerated cabinet for delivery trucks has been designed by Ace Cabinet Corp., New Bedford, Mass. Plugged into the plant power source at the end of the day, the box temperature will drop to 10 degrees below zero overnight. Unplugged in the morning, it will keep a full load of ice cream or frozen foods

The new Acemobile hold-over refrigeration unit installed in delivery truck.

in perfect condition throughout the day, regardless of how often the lid is raised. Products remaining in the cabinet at the end of the day do not have to be removed.

Special "Eutectic Hold-Over Plates" maintain the proper temperature and the entire unit is insulated for additional temperature control. The interior storage compartment is 20½ inches wide, 14½ inches deep and 24 inches high, and provides ample space for 48 ½-gallon rectangular packages. The top of the box opens on counterbalanced hinges, providing complete access to every part of the interior. The latch handle has provision for a lock. Easily installed along side steering wheel.

Weld-Backing Compound

A SILICONE weld-backing compound recently developed by the General Electric Company is now available from G-E welding distributors, according to an announcement by the Company's Welding Department. The new compound permits greater welding flexibility by effectively promoting uniform penetration and eliminating the harmful effects of air on the underside of welds. It is well suited to applications in which the underside of the joint is difficult or impossible to reach for cleaning.

Made from "bouncing putty," the silicone weld-backing compound is similar to paint in appearance and does not require the addition of any other ingredient before use. One coat, one-half inch wide, applied with a brush to the back of the joint, will give adequate protection, according to G-E engineers. A pint applied in this manner will cover more than 1300 linear feet.

New Spanner Wrench

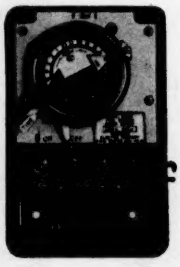
A Spanner Wrench designed for rugged use and maximum safety of user has been produced by The Bergman Safety-Spanner Co., Toledo, Ohio. For years industry has sustained injuries to workers through makeshift spanners or helpers which either broke or slipped. This new wrench provides a positive grip and will not

New Spanner Wrench

bend or break under any conceivable human physical pressure. It was devised for the specific purpose of rotating hand wheels on stubborn valves, without fear of disengagement, breakage or sparks. It is result of more than two years experimentation and development with cooperation of one of the largest oil refineries. The 18-inch No. 102 size weighing 2 lbs. 13 ounces is now available. A super size is being developed.

New Time Switch

A NEW series "Memory Master" time switch has been introduced by Paragon Electric Company, Two Rivers, Wisconsin. Among its notable features are "Torsion clutch" dial

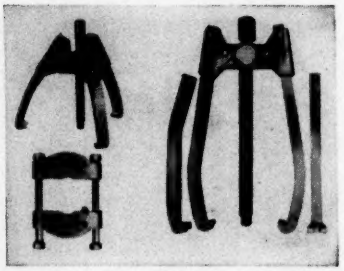


Memory Master Time Switch

drive for free movement of dial, and manual check of "On-Off" operations. Additional trippers can be added quickly without removing dial to provide for 16 operations per 24-hour period. The complete movement can be quickly removed from case by loosening one screw, no loose parts to get lost or misplaced. When locked in, movement is secure and rattle-free.

New Gear Puller Line

A COMPLETE system of gear and wheel pullers for maintenance of industrial equipment, vehicles, etc., has been added by J. H. Williams & Co., Buffalo, N. Y. The latest refinements in design have been incorporated in the series. Jaws and blocks are forged from selected steel and heat-treated for extra strength and safety. Jaw clips are self-adjusting.

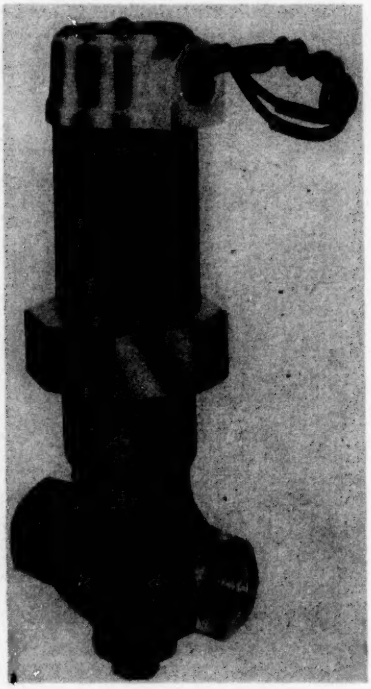


Set of New Gear and Wheel Pullers.

Forming screws are made of high quality alloy steel and heat-treated. New "unified" thread on screws and blocks is latest development in screw thread design. Two and three-jaw styles, in many sizes, are available with changeable jaws to extend range of their use and capacity. Several styles of pullers are equipped with attachments making it possible to assemble the right puller for the job.

New Solenoid Valves in Cast Iron and Cast Steel

A NEW line of cast iron and cast steel solenoid valves is now available from the Atkomatic Valve Company, Indianapolis, Ind., in sizes from ½ inch to 2 inches. Pressure range to 1000 P.S.I. at 200 F. temperature, 500 P.S.I. at 450 F. They are designed for handling all media normally injurious to bronze or brass not harmful to fer-

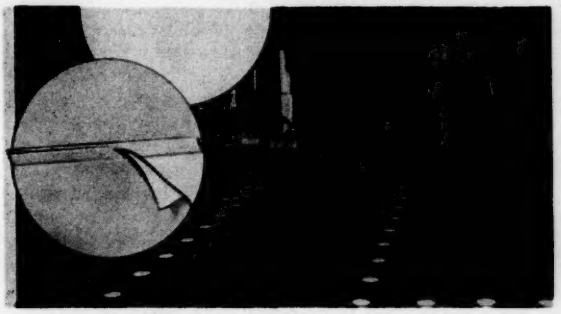


New Atkomatic Solenoid Valve

rous metals. New engineering features include stick-free internal design, stainless steel hooded pilot seat screw for more positive closing action and Teflon disks inert to all media except hot flourine. Removable inserts are used throughout.

Self-Adhesive Aisle Markers

ECONOMY and simplicity of installation, plus extra safety advantages, are claimed for the self-adhesive aisle markers manufactured by W. H. Brady Company, Milwaukee. Stock aisle markers are made of plastic, backed with a heavy duty, pressure-sensitive adhesive. They offer maximum visibility that a dotted line can provide. They are stocked in four bright colors, caution yellow, fire red, safety green and neutral white.



Brady Aisle Markers Applied on Warehouse Floor

Besides costing less to buy than paint or tape, these markers are economical to apply. They stick to any clean, dry floor without moistening, and may be used to form curved lines. Being only .005 inches thick, they lie flush with the floor and with their durable plastic surface they are highly resistant to abrasion, acids, oil, grease, salts, water and most common solvents.

Each aisle marker is mounted on a 2-piece folded paper liner which protects the adhesive until used. Stock circular aisle markers are available in two, three, four and five-inch diameters. Directional arrows in two, three, four and five-inch sizes. Special sizes, colors and shapes will be made up to order.

New Anti-Sweat Insulation Tape

A NEW anti-sweat insulation tape for cold water lines and air conditioning and refrigeration equipment has been developed by Presstite Engineering Co., St. Louis. Known as Presstite No. 165 Insulation Tape, it also serves as a gasket for metal flanges, wood and glass, and as a sound deadener or cushioner.

The material is a black, rubbery tape composed of rubberized asphalt, cork and asbestos. It is non-volatile, odorless, resistant to water, and has excellent adhesion to surfaces such as glass or metal. The tape retains its flexibility, adhesion and cohesion at temperatures as high as 158 F and as low as minus 20 F. It can be furnished in sizes ⅛ inch thick by 1 inch, to 7 inches wide, and is packed flat or in easy-to-use rolls.

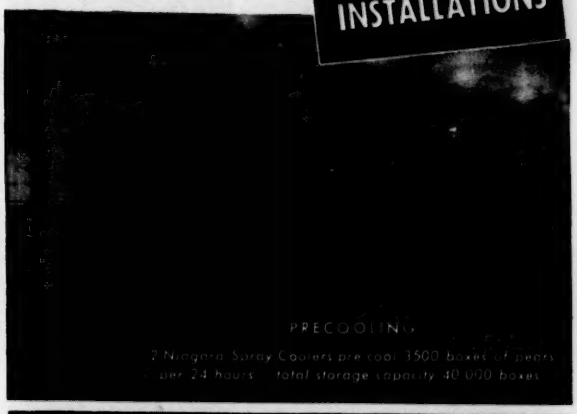
No. 165 Insulation Tape is one of many Presstite sealing tapes ranging in color from white to black, resistant to oil, gas, water or water vapor, varying in temperature resistance from minus 70 F to 375 F, and furnished in various extruded bead, tape and ribbon forms.

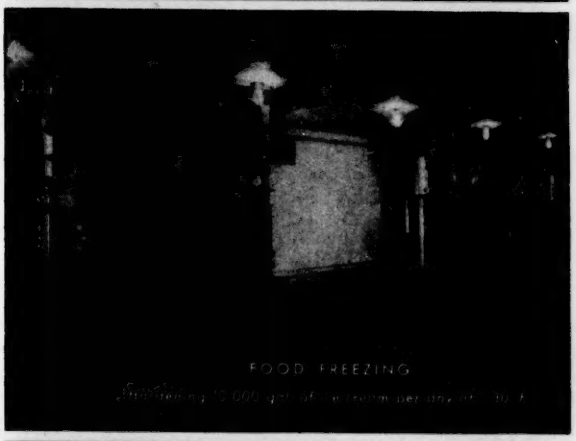
Water Hardness Test

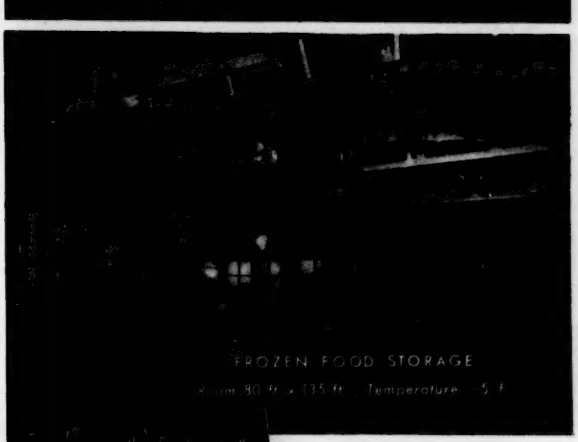
FIELD tests of water hardness sensitive to one grain per gallon (17.1 parts per million) require only a minute with a new "Speedy-Kit" announced by Calgon, Inc., and Hagan Corporation, Pittsburgh. A sample of water is measured into a marked glass vial; two drops of "Solution A" are added from a bottle, turning the water red. "Solution B" from second bottle then is added, one drop at a time, until the red color changes to blue. Each drop of "B" used represents one grain per gallon of hardness, as calcium carbonate. The method employed in using the new kit and contents, two bottles with "eyedropper" tops, one glass vial, represent a simplification of water test procedures based on Schwarzenbach methods now widely used in the United States and other countries.

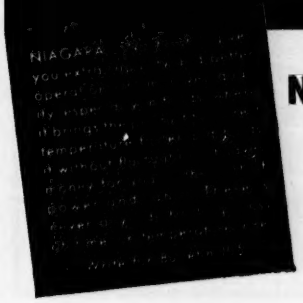
NIAGARA "No-Frost"

SUCCESSFUL IN BIG INSTALLATIONS









NIAGARA BLOWER COMPANY

Dept. IR, 405 Lexington Ave.
New York 17, N. Y.

Sales Engineers in Principal Cities of U. S. and Canada

When it's a question of new refrigeration coils, it's no time to speculate on dependability or to compromise on quality. And where it's a question of assuring efficient, uninterrupted operation and low maintenance throughout the years —

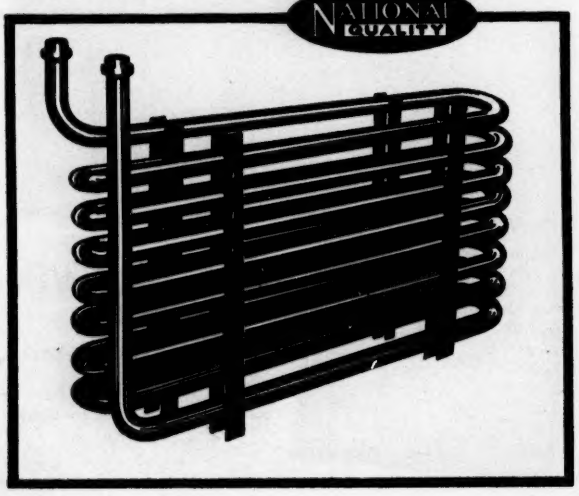
NATIONAL
REFRIGERATION COILS

offer you the benefits of over 70 years' specialization in the pipe-bending field: experienced engineering and exact production, with smooth bends, perfect welds, and accurate measurements.

Whenever you need coils, write for our free tracing-chart which shows standard dimensions ready to fill in. It will simplify your specifications—whether for zig-zag or nested box or conical or round-flat or reducing coils.

NATIONAL PIPE BENDING COMPANY
162 RIVER STREET • NEW HAVEN, CONN.

Established 1883



PRESS BRIEFS

Ice and Cold Storage Facilities for New Fish Harbor in Pakistan

A purchase request has been approved for installation of ice making and cold storage facilities in a modern fish harbor to be built at Karachi, Pakistan. The ice making plant will have capacity of 15 tons per day and the cold storage will consist of three rooms to be held at 0 F totaling 7,000 cubic feet. For this equipment the United States will pay a total of approximately $70,000, including ocean transportation and handling charges. An agreement covering the project was signed between the United States and the government of Pakistan last year.

Plans have been made and some of the major equipment already ordered for the million dollar project which upon completion in about three years promises to revolutionize the Pakistani fishing industry and improve Pakistani living standards through providing more fish as food, through mechanized boats which can reach the plentiful waters of the outer Arabian Sea; more fish for upcountry areas such as the Punjab; through modern refrigerating and cold storage equipment which will better preserve the fish catch; more jobs for Pakistani fishermen; through expanded demand for fish; more opportunities for future private investment in the Pakistani fishing industry and secondary industries; through the expansion of the market for Pakistani fish at home and abroad.

The fish harbor is expected to be the first of its kind in all Asia except Japan. The Government of Pakistan is contributing Rs.1,262,000 (approximately $375,000) for the first year's construction and the U. S. Foreign Operations Administration $750,000.

The Central Engineering Authority and the Department of Fisheries are currently co-operating with a team of FAO experts from the USA in ordering equipment and supplies. The Government has also requested FOA technicians as advisers in building and operating the harbor.

The Central Engineering Authority of Pakistan will be responsible for all engineering and construction. The U. S. Operations Mission will furnish the service of one fisheries specialist and one harbor construction engineer as technical adviser for the project as a whole and one refrigeration engineer for the cold storage segment of the project. The fisheries adviser, Leroy S. Christey, and the construction engineer, James W. Dunham, are already in Pakistan. Other U. S. technicians will assist on the project if additional services are agreed upon by the two governments.

Grocers Plan to Add Refrigerated Space

OVER 13,000 top volume independent grocery stores plan on adding an average of more than 25 linear feet of refrigerated display space during 1954 according to a recent equipment survey in New York. This survey reflects a tabulation of replies from a representative group of the country's 66,000 top volume independent grocery stores, including supermarkets.

The trend to self-service operations is evident in the fact that over 90 percent of these top volume operators presently have some refrigerated display cases for meat, poultry and fish.

The predicted increases in this equipment will in large part be used to extend self-service shopping with frozen food cases coming in for the largest share.

for PEAK PERFORMANCE on All Air Conditioning Systems

buy Sporlan right down the line!

and by Right Down the Line Peak Performance we refer to

4 VITAL ITEMS *that can Make or Break any Air Conditioning System!*

Let's look at item No. 1... The Filter-Drier! Clean, dry, acid-free, sludge-free refrigerants are yours when you use a Sporlan Catch-All!

Only Sporlan can offer you the Catch-All, the perfect filter-drier with the molded porous core. It offers the greatest filtering area, and the highest degree of activation for the removal of acid, water, sludge and foreign particles. It cannot powder. It cannot pack, and it dries the refrigerant to an end point so low that any remaining moisture is absolutely harmless!

Sporlan also offers you the perfect answer in item No. 2... Solenoid Valves! Nothing can touch the Peak Performance of Sporlan Solenoid Valves. They're tight closing, their coils are layer wound (not random wound), they're so well insulated, so moisture proof, that they defy electrical failure!

Item No. 3... The Thermostatic Expansion Valve is important, too! For maximum evaporator capacity at all times, it is essential to eliminate hunting in air conditioning valves. Fortunately, thanks to Sporlan's FLOW MASTER element, you will never have to worry over alternately flooded and starved evaporators again... just order a Sporlan valve with FLOW MASTER element and Peak Performance is yours!

But, how about item No. 4... The Refrigerant Distributor? To get Peak Performance in all evaporators, Sporlan distributors have a perfectly designed nozzle and conical button to assure uniform distribution to all circuits.

So Remember... item for item, every Sporlan product will give you Peak Performance... so why not get Peak Performance Right down the Line on ALL air conditioning applications... specify Sporlan throughout!

SPORLAN

SPORLAN VALVE COMPANY

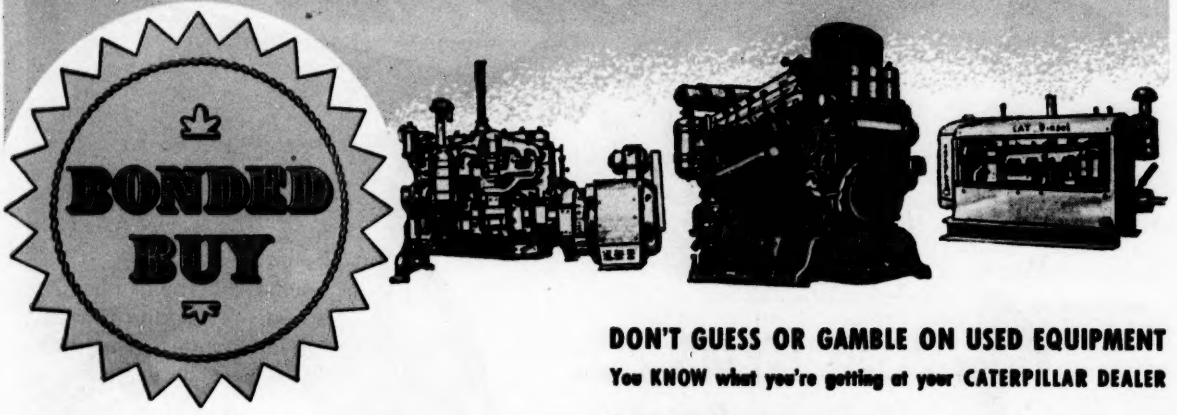
7525 SUSSEX AVENUE ST. LOUIS 17, MO.

EXPORT DEPARTMENT 89 BROAD STREET NEW YORK 4, N. Y.

ANNOUNCING A

$10,000 GUARANTEE ON USED EQUIPMENT!

Never before a guarantee like this! Only your CATERPILLAR DEALER offers a "BONDED BUY" on used Caterpillar-built equipment backed by a bond of $10,000.



Your Caterpillar Dealer now offers you a "BONDED BUY" on used Caterpillar Diesel Engines and Electric Sets backed by a bond of $10,000 issued by The Travelers Indemnity Company. This protection is yours when you purchase a "BONDED BUY" machine.

This is the *first* time in the heavy-duty engine field that such an offer has ever been made!

You are also offered two other classes of used equipment buys—"Certified Buy" and "Buy and Try." These cover used units of *any* make.

What does this mean to you? *It takes the guess and gamble out of buying used equipment.* You know what you're getting. Your assurance is in writing. What's more, *no matter what your needs, cost-wise or work-wise,* you have a *choice* to meet them.

Only your *Caterpillar Dealer* offers you this across-the-board selection. The best source of new engines, he's also your best source of used engines. Whether you're in the market for one or many, he's the man to see for your *best* buy. See him today for complete details on guaranteed used engines and electric sets!

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

DON'T GUESS OR GAMBLE ON USED EQUIPMENT

You KNOW what you're getting at your CATERPILLAR DEALER

Your Caterpillar Dealer offers you three clear-cut classes of used equipment. He backs each one in writing. You buy with confidence, sure that the equipment is honestly described. See him for the best values on the market!

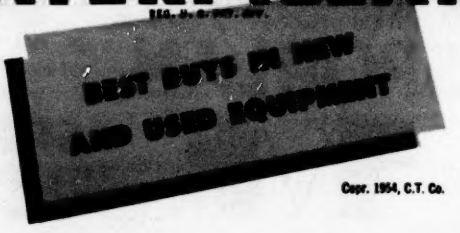
(1) "BONDED BUY" Only the best in used Caterpillar Engines and Electric Sets. Each "BONDED BUY" machine is backed by a Dealer's Guarantee Bond equal to the purchase price of the unit up to a maximum of $10,000. This provides a guarantee for thirty days against unsatisfactory performance due to defective parts. If a part should prove defective within the guarantee period under the normal conditions of your job and with proper maintenance, your dealer will put your unit back into operating condition *with no charge to you for parts and labor* up to the amount of the bond. The Dealer's Guarantee Bond is backed by The Travelers Indemnity Company. Your Caterpillar Dealer gives you this protection with your purchase of a "BONDED BUY" unit. Look for the "BONDED BUY" symbol—it's your assurance of the best in used engines or electric sets.

(2) "CERTIFIED BUY" Next best buy in used equipment! "Certified Buy" covers units of any make in good condition. Your performance guarantee is in writing backed by your Caterpillar Dealer.

(3) "BUY AND TRY" Bargains in used engines of any make. Buy and try them for a period mutually agreed upon by you and your dealer. Each "Buy and Try" unit carries his written "money-back" agreement.

"BONDED BUY" assurance effective in the United States

CATERPILLAR



DIESEL ENGINES • TRACTORS • MOTOR GRADERS • EARTHMOVING EQUIPMENT

Copr. 1954, C.T. Co.

In the Spotlight

REFRIGERATION is to play an important part in the construction of the Warragamba Dam now being built to supplement the water supply of Sydney, Australia. Tube-ice is used to chill the concrete mix and cold water is circulated through coils placed in the structure. These and additional details of how this refrigeration is to be applied and the equipment which will produce it is described in the article starting on page 15.

THE REFRIGERATION of eggs at point of production is an important factor in their retention of quality, according to two speakers at the Fact Finding Conference of The Institute of American Poultry Industries. Two papers on this subject are summarized on page 28.

COMPRESSOR DESIGNS of higher speeds have been forced upon manufacturers by the demand for light weight, minimum space, low first cost, and better service life, all of which makes meticulous care necessary by the operating personnel. These points and other factors involved in extending compressor life are covered in the article "Why Compressors Grow Old," which starts on page 20.

PEANUT CANDIES when properly packaged and stored at low temperature may be kept fresh for as long as two years. Refrigeration retards staleness and rancidity, preserves the fresh color, aroma, and flavor, and prevents insect infestation. These are a part of the findings of a five-year study conducted at the Georgia Experiment Station. For report on study see page 26.

THE FOOD SECTION of the National Safety Council held a meeting attended by members of the Executive Committee representing various branches of the food industry. Reports indicated progress toward increased safety. See page 24.

ICE USERS, not icemen, are to blame for the unsanitary conditions of ice reported some months ago from Kansas, according to a New England iceman. Implied criticism of the entire ice industry is not warranted, he says, in an interview on page 28.

A LARGE refrigerated storage facility is operated at Auckland, New Zealand for preserving local products, mostly for export to Britain, among which are large supplies of frozen beef coming from two large refrigerated warehouses and three meat packing houses. The article, with pictures, starts on page 30.

SPECIAL SPEAKERS will highlight the annual AWA-NARW Convention to be held at Boca Raton, Florida, April 25-29. In the words of John Mercer, convention chairman, this year's meeting will be one of the best on record. In addition to the business program, there will be entertainment and two post-convention tours. For details see pre-convention story starting on page 40.

COLD STORAGE holdings of frozen fruits, frozen vegetables, butter, cheese, poultry, and beef February 28 were above average for this time of year. Stocks of frozen fruits and vegetables were reduced, creamery butter increased and meats were below a year ago. For additional details, see page 44.

DETERMINING brake horsepower from electric panel instruments is discussed in question 993, NAPRE Question Box. Manufacturer's characteristics chart or curve on motor in question, essential to calculations. See page 35.

FROZEN FOOD distributors expect this year's sales to run ahead of last year which was the biggest sales year to date. Heaviest increase in sales is expected to be of the highly processed "convenience" products still being developed. For additional news of frozen food distributors see page 37.

PEST CONTROL is a vital concern of industry because losses and costs runs over a billion dollars a year. This calls for an effective control program and a knowledge of the common insects and rodents and the qualities of insecticides. Some of the effective methods of controlling rodents and other pests are discussed briefly in the article starting on page 47.

BUSINESS in 1954 will equal or exceed the all-time peak reached in 1953, according to a majority of the nation's top retail, wholesale and service industry executives, questioned recently by the Chamber of Commerce of the United States.

THE SUPPLY of Florida oranges indicates a big increase, with a million young trees coming into bearing this year and three million more during the next three years.

Inspector Refrigerated

RETURNING from a delivery, the driver of a refrigerated meat truck at Jackson, N.C., saw some one in the rear of the truck. He slammed the door on the refrigerated compartment and started driving around in search of a policeman. When he couldn't find one he stopped at a service station and called several men to the truck. They cautiously opened the door—and found a chilled-to-the-bone meat sanitary inspector.

186,072,500 pounds of Tube-Ice used in building 2 WESTERN DAMS*

Yes—that much ice was required to cool the concrete mix in order that it set properly to develop its ultimate strength for two outstanding dam structures.

The important part of this message to you is that the compact and readily portable Vogt Tube-Ice Machines pictured here set this record without even the replacement of a freezer tube. What's more, they are *ready to go again* whenever ice is needed in quantity.

Tube-Ice is widely used in process work and for preserving shipments of meat, fish, milk or vegetables... and is produced at the lowest possible cost per ton since a Tube-Ice unit occupies less space, has fewer parts, uses less power than any other method for making ice.

Tube-Ice Machines are available in sizes from 2000 lbs. per day up to any desired capacity. Send for free Bulletin TI-3.

**McNary Dam, Washington, and Pine Flats Dam, California, required a total of 2,730,000 cu. yds. of ice cooled concrete mix.*

HENRY VOGT MACHINE CO.
LOUISVILLE 10, KENTUCKY
BRANCH OFFICES
...hia, Chicago, Cleveland,
...ston, W. Va.

Automatic

Vogt TUBE-ICE MACHINE

Tube Ice Chills Concrete Mix In New Australian Dam Construction

J. J. BUDGE, Mgr.
JAMES BUDGE, Pty. Ltd.
Courtesy Sydney (Australia) Water Board

Refrigeration plays as important a part in dam construction "down under" as in the United States. An Australian engineer describes the water needs of his city, the three-step solution, the refrigeration needs in dam construction, and the units required for supplying the project with chilled water and fragmented ice. Participating in the refrigeration work were United States concerns and the Australian firm of the author, both as manufacturers and installation contractors.

Fig. 1—Engine room in refrigeration system of Australia's Warragamba Dam showing one of the five 10 x 10 Budge Compressors.

ONE of the major tasks that has continually faced the Sydney (Australia) Water Board has been that of providing an ever increasing water storage. Since the inception of the Board (1888) as the controlling authority for the water and sewerage services of the Sydney Metropolitan Area and South Coast towns, the population under its jurisdiction has increased approximately sixfold. In that same period the water consumption has increased over sixteenfold. Warragamba Dam will relieve that situation.

The name Warragamba applies to a length of approximately 14 miles of river. A distinctive feature is that the course of the river consists of a sandstone gorge approximately 1,000 feet wide with sides 400 to 500 feet high adjoining the Nepean reservoir, widening to 2,000 feet near the point of junction with its two main tributaries. Above this the valley opens out widely. A comparatively short and high dam built across the gorge will therefore impound a vast quantity of water.

The first stage of a long range program for the development of the water resources of this area took place in 1936, as an emergency measure during the greatest drought ever recorded for Sydney, which lasted nearly eight years. In order to supplement the diminishing storages in its four upper Nepean reservoirs, the Board constructed an over-shot weir (a short dam or dike) some 50 feet high together with a pumping station and pipe line which, since completion in 1940, has delivered at a rate of up to 40 million gallons a day. The pumping station is located in a cavern 173x 22x37 feet, excavated in the solid rock of the eastern bank, almost 200 feet below ground level, and equipped with six 1,000 h.p. motors and centrifugal pumps.

The second stage of development involves the building of an 84 inch diam. main to the reservoirs and is being carried out at the same time as the third and most spectacular stage.

Highest Dam in Southern Hemisphere

The third stage of development, now in course of construction, involves building a huge dam across Warragamba Gorge about a mile upstream from the existing weir. Rising some 400 feet above river bed level, this dam will be the highest in the Southern Hemisphere. Tapering up from a base over 300 feet thick, the wall will contain about 1¾ million cubic yards of concrete, requiring 2½ million tons of aggregate.

The latter will be conveyed to the dam site from extensive gravel and sand deposits just over 12 miles away by an aerial ropeway with a delivery capacity of 170 tons per hour. When the dam is completed and the storage filled to capacity, the water impounded will reach a distance, at its furthest point, of 36 miles from the dam and will have a lake area of approximately 34 square miles with foreshores measuring some 200 miles. By providing an additional storage capacity of 460 billion gallons, more than 3½ times the total capacity of all existing storages, Warragamba Dam will meet Sydney's water requirements for many years to come and be capable, with existing works, of supplying a population of almost four million.

Warragamba will be a large straight gravity dam, planned with a system of both transverse and longitudinal construction joints at 50-ft. spacing. (See Fig. 4.) The dam will be built as a series of independent prisms which will later be grouted together to form a solid concrete wall. This form of construction is adopted to avoid cracking in the concrete due to heat generated during the process of hydration of the cement. It is aimed to pour concrete at the rate of 2000 cu. yds. per day.

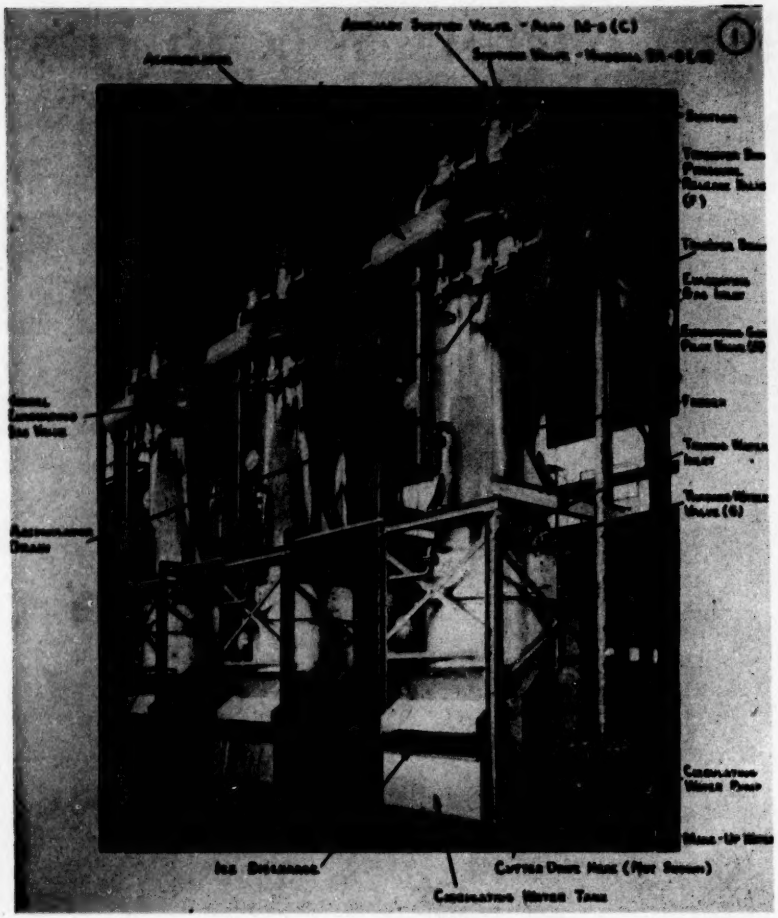


Fig. 2—Three Vogt tube ice machines for Warragamba Dam construction as they appeared prior to shop test, dismantling, and export. Combined output is rated at 170 tons per day.

Refrigeration Applications

To withdraw the heat of hydration, a system of cooling pipes is to be embedded in the concrete. Chilled water will be circulated through the pipes to bring the concrete to its final stabilized temperature. To supplement the cooling pipe system, the placing temperature of the concrete will also be controlled. The addition of ice to the concrete mix has been found to be an effective and economical means whereby this control may be obtained.

It is proposed at Warragamba to place concrete as low as 55 F. During the summer months this will require that the bulk of the mixing water will be added in the form of ice, and the remainder chilled at 34 F. The maximum ice content will be 132-lbs. per cubic yard of concrete. The concrete will contain cobbles up to 6 in. maximum size and have a water-cement ratio by weight of 0.58. A plant capable of producing simultaneously 170-tons of ice and 10,000 gallons of water per day at 34 F. is required for the above purpose.

As the ice will be fed into the concrete mixer it must be of such size and shape that it can be readily conveyed and weighed. It must also be small enough to fragment and thoroughly melt during the three-minute mixing cycle. In addition, overall efficiency requires that the ice output may be quickly adjusted to suit the rate of concrete pouring.

U. S. and Australian Equipment

The Water Board accordingly invited tenders for suitable plant. On the basis of cost, a contract was awarded to the joint tenderers James Budge Pty. Ltd., Sydney, N.S.W., and Henry Vogt Machine Co., Louisville, Ky., for the supply of a refrigeration plant for over $200,000 dollars, approximately. The terms of the contract required H. Vogt Machine Co. to furnish three tube ice machines (Fig. 2) to be installed by J. Budge Pty. Ltd. who also supplied and installed the balance of the plant. (Fig. 1.)

The tube ice machines are housed adjacent to the concrete mixer tower. The ice is produced in the form of hollow tubes having a shell thickness of 3/8 in, and crushed into segments about one-inch long. As the ice is produced it is dropped into hopper-bottomed storage bins capable of storing 60-tons. They feed by gravity onto a screw conveyor leading to the ice batcher in the mixer tower, where the ice is automatically weighed and emptied into the concrete mixer.

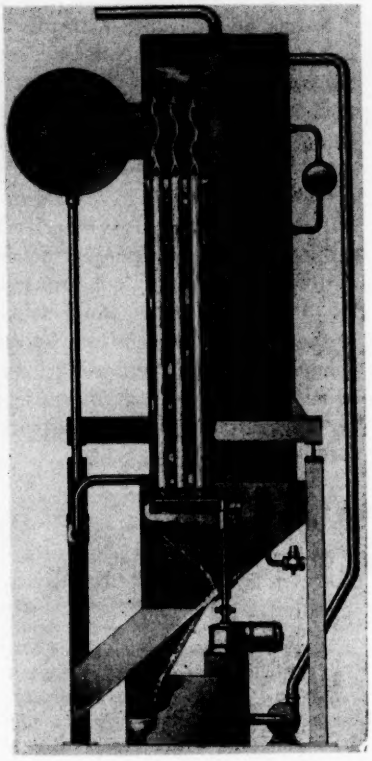


Fig 3—Semi-sectional view through Vogt machine showing the ice-making cycle.

On approximately the same level as the tube ice machines, a water cooler of 4,500-gallons capacity is installed. The function of the cooler is to deliver water at 34 F to the concrete mixer and the tube ice machines. The Budge ammonia compressors and evaporative condensers are installed at the base of the ice tower.

Tube-Ice Machines

Each of three tube-ice machines, as illustrated in Fig. 3 consists of a vertical cylindrical shell containing a nest of tubes, a transfer drum, cutter, ice chute, pumping tank, water pump, the necessary piping, valves, and automatic controls. To make ice, water is pumped from the lower tank to the box at the top of the machine. From there, it gravitates through the distributors which direct water over the

inner surfaces of the tubes. The ammonia evaporating in the shell causes ice to form on the inner surfaces of the tubes. Surplus water which is not frozen returns to the pumping tank and is again circulated. This action proceeds until the desired thickness of ice is formed.

The freezing period is started and stopped at pre-determined intervals by means of an automatic timing mechanism. High pressure gas from the condenser then displaces the refrigerant in the shell. This gas and further thawing at the base of the tubes causes a slight melting of the ice so that it drops from the tubes. As it descends it passes by a cutter plate which cuts or crushes the ice cylinders to the required size. The ice is discharged along an inclined metal chute, perforations in which allow the meltage to return to the pumping tank for re-circulation.

Upon discharge of the ice the ammonia is again admitted to the shell and the water pump resumes circulation of water through the freezing tubes. Make-up water to replace that frozen is drawn from the chilled water tank.

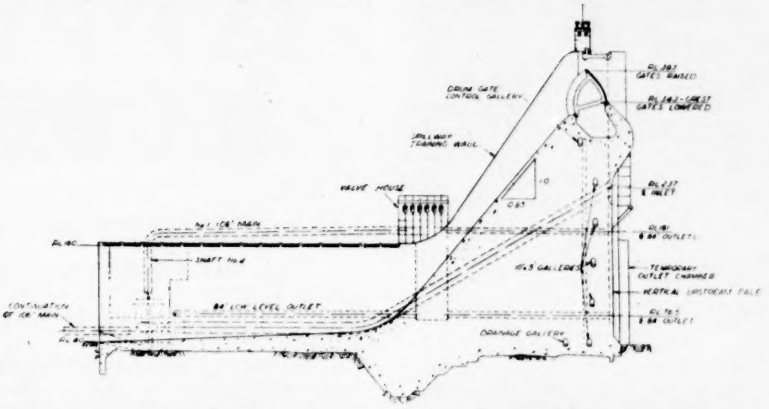


Fig. 4—Engineers drawing showing section through Warragamba Dam. Refrigeration has an important role in concrete placement for this 400 ft. high, 300 ft. thick by 1300 ft. long water reservoir construction.

Operation Timer Controlled

All the operations of the tube ice machines are automatically controlled by an adjustable timing mechanism, which controls the water pump, starting and stopping it periodically. After the water is in circulation the timer opens the suction valve and liquid refrigerant feed valve, and freezing proceeds. At the end of the freezing period the timer closes the suction gas, the liquid feed and the water valve. High pressure gas from the condenser is then admitted by timer control to the freezer to force the liquid ammonia into the transfer drum. The ice is then thawed and released. At this stage the timer starts the electric motor driving the cutter so that the ice is correctly sized as it drops into the storage bin.

Budge Compressors

Five Budge 10 x 10 inch twin-cylinder vertical, enclosed type, pressure lubricated ammonia compressors have been installed (Fig. 1). These compressors have an operating speed of 300 rpm, giving at 20-lbs. suction and 205-lbs. delivery pressure, a rated capacity of approximately 61-tons, and at 40-lbs. suction and 205-lbs. delivery pressure, a rated capacity of 102 tons, each. Each compressor is driven by a slip ring Brook induction motor rated at 150 hp at 960 rpm. These drive the compressors by V-belt drives.

Four of the five compressors will operate on the three-tube ice machines to produce 170-tons of ice per day from water at 34 F. The other compressor will operate on a submerged coil in the water cooling tank and will automatically maintain within it at 34 F. sufficient water for the ice-making machines and the supply to the concrete mixers. Precooling the water prior to admitting it to the tube ice machines reduces the estimated power consumption by approximately 30 bhp.

Condensers

Four Budge evaporative condensers, each rated at 100-tons refrigeration, are installed near the tower containing the tube ice machines (Fig. 5.)

This type of condenser consists of 12-removable coil sections of ¾ inch ammonia pipe. The coils are contained in a housing of welded construction, using ⅛ and 3/16 inch mild steel plate, zinc metal sprayed internally. The lower section forms a water sump fitted with pump, ball float valve and overflow. The fan is of the axial flow type mounted on the top of the bodywork and driven through vee belts from a motor attached to the fan casing. A set of moisture eliminators is incorporated above the centrifugal water spray nozzles.

Water Cooler

The water cooler consists of a sloping tube type evaporator in which there are four-units coupled into a common surge drum mounted in a steel tank. Each of the four units consists of intermeshed 1½ inch ammonia pipe bent *concertina* fashion and welded into top and bottom headers. The tank will be 30 x 7 x 4-ft. 6 inch deep, made from ¼ inch plate. The net water capacity will be 4,500-gallons

Two vertical spindle propeller type agitators running in an elbow hood will circulate the water in the tank and direct the flow of water on to the evaporators. The tank is insulated bottom and sides with 4 inch slab cork with ¾ inch reinforced cement rendering on outside. The top is covered with 3 inch T&G timber.

Ice Storage Tank

The ice storage tank is the gravity flow type fabricated from ¼ inch plate. It measures 33 x 22 x 10-ft. deep, and has a gross capacity of 60-tons. The normal period of ice storage will not exceed 8 hours.

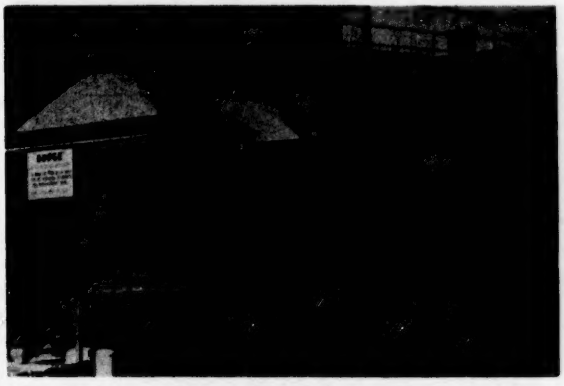


Fig. 5—Four 100-ton Budge evaporative condensers installed in Warragamba Dam refrigeration system. Each is rated at 100 tons.

Cooling of Eggs Pays Off Say Dealers

Refrigeration Required

R. M. SEXAUER
San Diego Cooperative Poultry Assn.

IN 1949 we revised our quality program to require that our members gather their eggs three times a day and place them immediately in a cool room equipped with some cooling device such as a so-called "desert" cooler. We noticed an improvement in quality immediately, but this type of cooler wasn't dependable because of changing humidity conditions. So, after studying the results of comparative tests between mechanical refrigeration and evaporative coolers, made by Dr. Lorenz at the University of California, we decided to encourage our members to install mechanical refrigeration by paying those who did an extra one cent per dozen premium.

A year later we advanced this to two cents, and finally we made it a requirement that all members selling their eggs through our cooperative must install mechanical refrigeration, and no new producers were accepted until they met all the requirements of our quality program. Our next step was to remodel our plant receiving room and equip it with air conditioning to maintain a temperature of 52F.

1948 Study

In 1948, a study of methods of handling eggs in retail outlets showed that many retailers did not realize how eggs must be cared for, to maintain quality. They were buying too many eggs at one time, they were not protecting them from drafts or heat, they were not rotating them properly according to their age.

To encourage retailers to correct these mistakes, we had a self-contained refrigerated self-service box designed to hold 120 dozen cartoned eggs, and offered them to some of our accounts without charge—on a contract basis.

This contract called for several things: (1) our Association would furnish and maintain the box; (2) the retailer would supply space for it; (3) the retailer would pay the electrical costs; (4) the retailer would use the box for Association eggs only; and (5) the retailer would permit our sales driver to check the rotation of inventories.

After four years, with 16 units still in service, we've come to several conclusions: (1) the retailer is more egg sales conscious because of our interest and our investment in an attractive fixture for his store; (2) his customers feel they're buying a product of merit; (3) consumer acceptance has improved, as sales from the box increased while sales from cartons stacked alongside decreased. We've proved to our own satisfaction refrigeration from start to finish pays off. All eggs now make AA grade except for those with blood spots, inferior shells, and poor shapes. And our retail customers are selling more eggs.

Tests Show Value of Refrigeration for Eggs

W. J. STADELMAN
State College of Washington

DURING the summer of 1953, eggs from two commercial farms in Western Washington were stored on the farm with and without refrigeration. When they were delivered to the first receiver, candled grade and internal quality were determined on a random sample basis. They were divided into two lots —one half refrigerated while they moved through a wholesaler, a jobber and a retail outlet—and one half not refrigerated.

Under farm refrigeration, the average of eggs from one to seven days old dropped only six Haugh units (a precise measure of broken-out albumen quality) under their day-laid quality. Eggs not refrigerated on the farm dropped 12 units. Eggs kept under refrigeration through market channels left the retail store 12 days after delivery to the first receiver only 12 Haugh units under their day-laid quality. Eggs not refrigerated during the 12-day marketing period showed a drop of 32 points in the Haugh unit value.

With adequate farm refrigeration, that is 50 F walk-in refrigeration, it's possible to hold eggs on the farm up to seven days and still market an egg as good or better than eggs held only three days on the farm without refrigeration. Eggs marketed twice a week from farms with refrigeration were, however, superior to eggs marketed only once a week and also superior to eggs that were not refrigerated on the farm. If refrigeration cannot be maintained on the farm and during marketing, speedy movement is the next best substitute, although it's a poor one.

Summaries of papers presented at Fact Finding Conference of Institute of American Poultry Industries.

Packaging Important For Frozen Poultry

PACKAGED poultry quality depends largely on the proper selection of packaging films designed to meet the specific requirements of the product according to Herbert Nagel of the Du Pont Film Department's technical service station.

Speaking at the recent poultry and egg marketing school conducted by the U. S. Department of Agriculture at the University of Maryland (Sept. 11), Mr. Nagel said that for frozen poultry, tough, flexible polyethylene film has the following necessary properties for this task:

1. A high degree of moistureproofness to prevent dehydration and a subsequent freezer burn.
2. A high degree of gasproofness to minimize oxidation resulting in off-flavors, off-odors, appearance changes, etc.
3. Ability to withstand storage at temperatures as low as -70 F. for long periods without breaking and cracking (this would result in dehydration and oxidation within a short time). For similar reasons film flexibility and good wrapper "cling" are important. (The latter eliminates the presence of air pockets.)

Big Gain Expected For Prepared Frozen Foods

PREPARED foods "have the greatest sales potential in the frozen food industry according to George Mentley of Birds Eye, speaking at the recent Frozen Food Packers Convention. "More than 30 percent of frozen food sales on the West Coast are from prepared products," he said. "A similar development may be expected in the East."

At the same convention it was pointed out that Americans ate 36 pounds of frozen foods apiece in 1953, compared to only 17 pounds four years ago. Also, it was revealed that 3.4 billion pounds of frozen foods of all types were packed last year, 17 percent more than in 1952 and triple the volume of only five years ago. In 1954 packers expect to put up about 4.5 billion pounds, according to an official industry forecast. — Cold Facts.

California Frozen Food Pack

CALIFORNIA Frozen food processors produced a record pack of 426,345,302 million pounds of fruits and vegetables in 1953, a 26 percent rise from the 337,674,537 pounds packed in 1952, the Western Frozen Food Processors Association has reported.

In planning or estimating low temperature insulation... note how this

FREEZER ROOM

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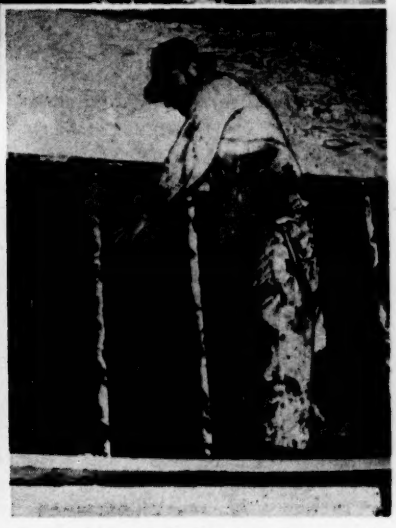
Contractor used blower to transport Palco Wool Insulation to roof, then hand-packed to proper density.



New void-free method of installing Palco Wool Insulation allowed complete inspection of wall area before applying interior sheathing. A reprint describing simple void-free packing method is *available on request.*

Asphalt emulsion and vapor-proof paper with joints well cemented, and a second coat of asphalt emulsion were applied to concrete sub-floor. Three layers of Palco Board were laid with joints staggered. 15 lb. felt was then applied, and a 4" finish slab of reinforced concrete was poured.

In order to provide the *best engineering* for this modern freezer room, the *right combination* of insulating materials was required. Loose fill Palco Wool offered high insulating efficiency, light weight, resilience to maintain permanent void-free fill, and ample 12" thickness at low cost for roof and wall insulation.

Laid in three 2" courses, Palco Board provides a 6" overlapping insulation layer on a vapor-proofed concrete sub-floor. With high compressive strength, Palco Board is a most efficient floor insulation that supports heavy storage loads. Both Palco Wool and Palco Board are moisture resistant and odorless.

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has high efficiency of .255 B.t.u., ideal for all loose fill applications.

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Why Refrigeration Compressors Grow Old

Compressor designs of higher speeds have been forced upon manufacturers by demand for light weight, minimum space, and low first cost, which makes meticulous care necessary.

CLAYTON B. CRAMER,
Application Engineer
Carrier Corp., Syracuse, N. Y.

THE current trend in refrigeration compressors demands lightweight machines, minimum requirements low first cost and satisfactory service life. To meet these demands, manufacturers have been forced into compressor designs that embody higher speeds. These higher speeds do not involve great increases in piston speeds but merely higher rotating speeds, which permits smaller diameters and shorter strokes, resulting in smaller machines. The use of higher rotating speeds immediately suggests meticulous dynamic balancing. Building the component parts of a compressor to very close tolerances with automatic machinery minimizes balancing the final assembly.

Reciprocating compressors built today are attaining standards of excellence never before achieved. Designers of these fine machines are entitled to a vote of appreciation by the individuals charged with their operation and maintenance. Because more automatic protective features are being built into the compressors, *more emphasis must be placed on training the operating personnel if they are to do a better job in extending the life of the compressor.* Four factors contribute to shortening the life of a reciprocating compressor; these include application (or rather mis-application), system contamination, moisture and time.

The demand for light weight, minimum space requirements, low first cost, and satisfactory service life in compressors has forced manufacturers into compressor designs of higher speeds. These higher speeds require meticulous dynamic balancing, and because more automatic protective features are being built into them, more emphasis must be placed on training the operating personnel to do a better job in extending the life of the compressor. Factors in a refrigeration system involved in extending compressor life are: mis-application, contamination, moisture and time, according to the author. Compressor ratios, system cleaning, system dehydrating, and overhaul periods are discussed in detail. This article is from a paper presented recently by Mr. Cramer at a meeting of the Central New York Section, ASRE.

Compression Ratio and Application

Compression ratio is defined as the ratio of the absolute discharge pressure to the absolute suction pressure. The *absolute* pressure is the gauge reading, plus the atmospheric pressure. Users do not always realize difficulties which might ensue when attempting to operate compressors at too high a compression ratio. The compressor manufacturer will provide information regarding the maximum allowable compression ratio which must be seriously considered before the selection of a compressor can be made.

The user is interested primarily in obtaining a certain evaporator temperature. To obtain that temperature, he must operate his compressor at a definite suction pressure. If, for example, he is operating a freezing unit, he may wish to operate the evaporator at minus 40 F. or minus 50 F. These low temperatures mean high compression ratios. *As the suction pressure (and temperature) decreases, the compression ratio increases.* It also follows that the higher compression ratios produce high discharge temperatures.

("Freon-22") Monochlorodifluoromethane ($CHClF_2$)

Typical discharge temperatures for a compressor in a system are plotted in Fig. 1. Assuming that the discharge pressure does not change as the suction pressure is reduced, note the rapid change in the discharge temperature. For example, a suction pressure of 60 psig results in a discharge temperature of 151 F, while a suction pressure of 0 psig results in a discharge temperature of 220 F. Note also that even though the saturated suction temperature reduced from 34 F to minus 41 F, the discharge temperature rose 69 degrees F. It is the high discharge temperatures that introduce difficulties in compressor operation. It is very important that the user abide by the manufacturer's recommendations with respect to allowable compression ratios and allowable discharge temperatures.

High Temperatures

Discharge gas temperature should not exceed the flash point of the lubricating oil. Operation in excess of this value will bring about a rapid breakdown of the oil which, in combination with other contaminants, will contribute largely to sludging and high acidity of the oil. Such conditions have a very marked effect on the life of a compressor. Keeping the discharge temperature under 275 F at the compressor will usually fulfill this requirement.

Superheating the suction gas will result in a greater discharge temperature. For example (Fig. 1) note that at 0 psig the discharge temperature is 220 F when the compressor suction is saturated. However, the discharge temperature increases to 260 F when the suction gas is superheated 25 F (curve B). Since the discharge temperatures shown in Fig. 1 are measured at the external discharge valve, it follows that the temperature of the discharge valve assembly inside the compressor will be considerably higher.

Superheat in a suction gas should be kept to a minimum when operating at high compression ratios. In some cases with fluorinated hydrocarbon refrigerants, it may be advisable to insulate the suction line from the evaporator to the compressor. The use of a liquid-suction heat exchanger should be avoided in systems where high discharge temperatures are involved. Remember that the manufacturer's recommendations are provided to promote long compressor life and overall customer satisfaction. Disregard for such recommendations is an invitation to dissatisfaction.

Excessive Speed

The operating speed of a compressor must be consistent with the recommendation provided by the manufacturer. Operating speeds above the design value will reduce the life of the compressor. A modern high speed compressor can not be expected to give a satisfactory life unless an effort is made to prevent overspeeding.

Oil Dilution

Lubricating oil in a refrigeration compressor has an affinity for fluorinated hydrocarbons and ("Freon-12") dichlorodifluoromethane (CCl_2F_2) in particular can be absorbed in large quantities by oil. A mixture of CCl_2F_2 and oil will reduce the viscosity of oil in much the same manner as pouring gasoline in a lubricating oil. *As large quantities of refrigerant are added to the lubricating oil, viscosity is greatly diminished* and lower viscosity means less lubricating value. There is a certain quantity of refrigerant in the oil at all times, but during normal operating conditions this amount does not appreciably change the lubricating value of the oil.

Following prolonged shutdown periods, large quantities of refrigerant may be absorbed by the oil resulting in extremely low viscosity and violent foaming in the crankcase on start up. Compressor manufacturers have recognized this phenomenon and have incorporated features which minimize the effects of crankcase dilution. It is also important that in the application of the compressor various external means for minimizing the effects of crankcase dilution be considered. Since it is a well established fact that lubricating oil will absorb less refrigerant at higher crankcase temperatures, and will also absorb less refrigerant when the crankcase pressure is low, any device used to keep the oil at an elevated temperature or keep the crankcase at a low pressure, will minimize oil dilution.

The absorption of CCl_2F_2 by crankcase oil at various pressures and temperatures is shown in fig. 2. This chart also indicates viscosity (for a typical refrigerant oil) at various levels of dilution. For average operating conditions the diluation does not exceed 10 percent refrigerant by weight. However, during shut-down, severe dilution might be experienced.

Excessive Horsepower

A compressor should not be loaded to a capacity that greatly exceeds rated horsepower. If, for example, a compressor is designed for 1750 rpm and is nominally rated at 15 hp, it is possible by an improper choice of refrigerant to greatly overload the compressor at this speed. If the compressor meets its horsepower rating, using CCl_2F_2 at air conditioning level, the introduction of $CHClF_2$ into this system would seriously overload the compressor at this particular speed. Most manufacturers will tolerate an overload of 20 per cent. However, the use of heavier refrigerants may require lower compressor speeds to prevent overloading and to obtain maximum compressor life.

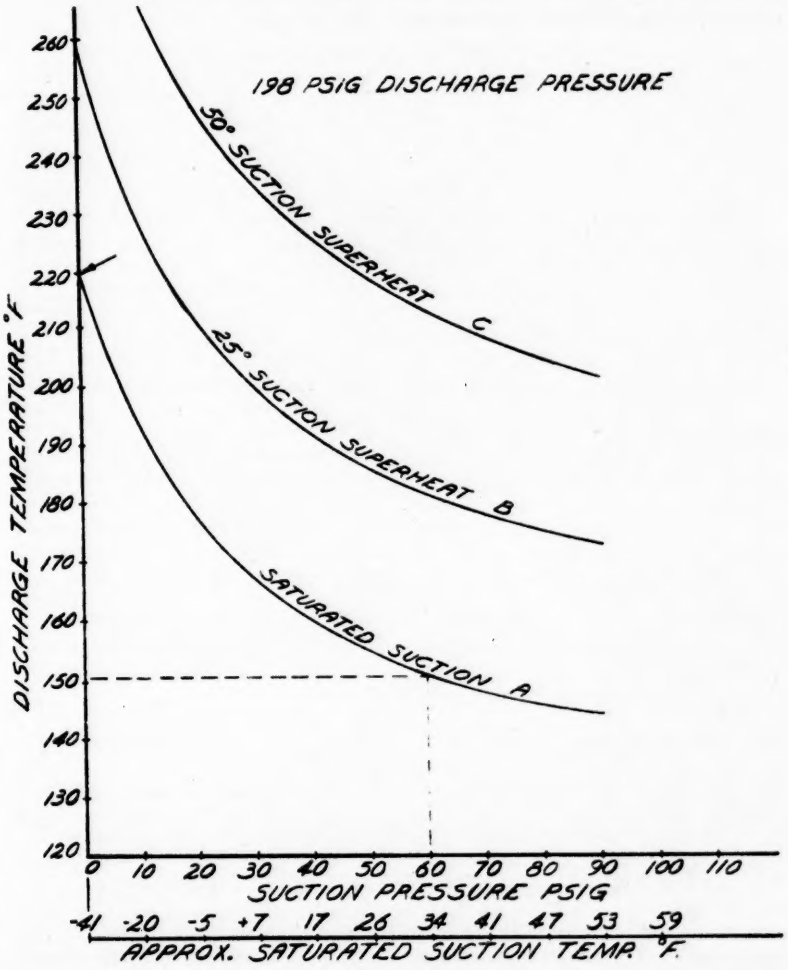


Fig. 1—Effect of suction pressure and temperature on discharge temperature—Freon 22.

System Contamination

Life of any compressor can be very seriously reduced by the introduction of contaminants such as scale, flux, water and air. Most vicious offender is the oxide scale found on the inside of steel and copper tubes, produced by heating joints for soldering or welding. *Care must be exercised in making a pipe joint to prevent scale from forming.* Mill scale in iron pipe is flushed into the compressor by the flowing refrigerant during the early stages of operation.

Another well known contaminant in a refrigerant system is pipe joint compound and soldering or welding flux. These materials provide abrasive reaction as well as chemical. While iron scale is usually formed in rather large particle sizes, it is very brittle and as it is rolled and tumbled through the connecting pipe line, it breaks up into very small pieces which will usually pass through even the best suction screen. Frequently the particle size is in the order of .001 to .003 inch, and will have no difficulty passing through a hundred mesh screen.

Contamination Effects

When system contamination is permitted to enter the refrigerant compressor, it very quickly becomes mixed with the lubricating oil. Modern

refrigerating compressors are equipped with forced feed lubrication which supplies oil under pressure to each connecting rod bearing. Particles of contamination in the oil become imbedded in the soft metallic surface of the connecting rod bearing, where it accelerates the wear on the crankshaft journal. Crankshafts are sometimes worn beyond usable limits within a very short operating period while the bearings show no measurable wear. Appearance of a badly contaminated connecting rod bearing resembles the surface of fine emery cloth and has about the same effect on a crankshaft journal.

The best protection against contaminating a compressor is to follow the manufacturer's recommendation with respect to the inclusion of a special filter within the suction gas strainer. The manufacturer usually does not install the special filter at the factory.

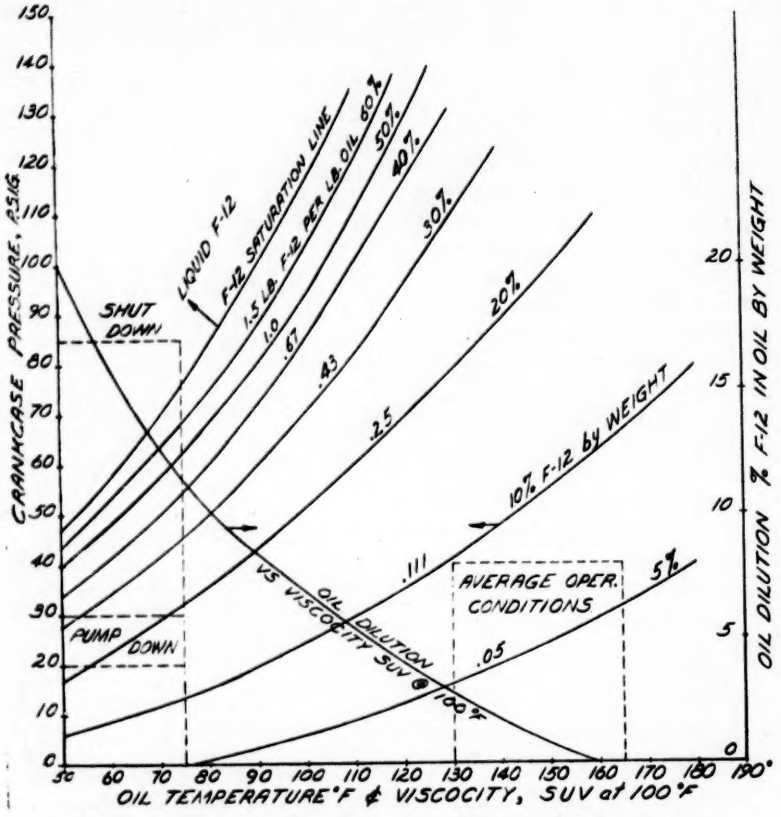


Fig. 2—Chart showing absorption of F-12 by lubricating oil.

Grit Protection

System contamination will discolor the lubricating oil which gives operating personnel a very vital clue to impending bearing difficulty. If the lubricating oil in a compressor is found to be discolored after a short operating period, it should be removed and examined for metallic particles and then replaced with clean oil. If metallic contamination is found, the connecting rod bearings should be removed and examined for metallic particles. The bearings should be replaced if contaminated.

Naturally such a filter will impose a pressure drop which will become greater as the filter loads with contamination. This of course will reduce the compressor capacity and therefore should not be allowed to remain in the suction strainer any longer than is necessary and should be examined at the end of about 50 hours of operation. If found to be clean it can be left out; otherwise, it should be cleaned and replaced in the suction strainer for another short period.

Moisture Origin

Infiltration of moisture into a fluorinated hydrocarbon refrigerant system can become extremely troublesome. Moisture can find its way into a refrigerant system in a number of ways, the best known of which is residual moisture trapped in the system during construction. Moisture can also enter the system with the refrigerant during the initial charge and be present in the lubricating oil used in the compressor crankcase. Due to the presence of lubricating oil in the compressor discharge and gas passages, a chemical breakdown of this oil due to excessive operating discharge temperatures may result in formation of moisture. In the case of a hermetic compressor, a burnout of the motor windings can result in a large quantity of moisture. Another everpresent possibility of moisture entering the system is during subatmospheric crankcase operation where minute refrigerant leaks or crankshaft seal leakage may draw air into the system. Presence of air can also result in corrosive combinations. Addition of oxygen to lubricating oil in the presence of high temperatures can result in the chemical formation of water.

Moisture Effects

There is some disagreement among specialists as to the exact effect of moisture on chemical reactions within a refrigerant system. There is almost unanimous agreement however, that moisture does play a part in the effect known as copper plating of compressor parts. It is also universally agreed that high operating temperatures also play an important part in the breakdown of lubricating oil and subsequent copper plating conditions. Without going into chemical reactions, it is known that a breakdown of lubricating oil as a result of heat and moisture, and possibly lubricating oil impurities, will increase the acidity of the lubricating oil.

When acid lubricating oil circulates through the copper coils of a refrigerant circuit, it dissolves a certain amount of copper and upon return to the crankcase, the elevated operating temperature of the crankshaft will cause the copper to plate on the rubbing surfaces. Present day compressors are constructed with minimum bearing clearance. It does not take a very thick coating of copper to completely replace the necessary operating clearance. Once copper plating starts and the bearing running clearance is diminished, the bearing will start to operate at an elevated temperature. It is believed that this elevated temperature further accelerates the plating of copper which can bring about a bearing failure in a relatively short time. Frequently copper plating will be found on the cylinder walls and piston surfaces and may result in freezing of pistons to cylinders.

It is believed that both moisture and high gas discharge temperatures

play a very large part in the formation of sludges within a compressor crankcase. The most destructive result of sludge is the restriction of the oil suction strainer with subsequent loss of lubricating oil pressure and bearing destruction. In a majority of cases where moisture has entered into a chemical reaction with a lubricating oil, a discoloration of the lubricating oil results. Generally, *any condition resulting in a discoloration of lubricating oil should be investigated and eliminated. The least precaution that should be taken is to change the lubricating oil when it becomes discolored.*

Another well known result of moisture contamination to the CCl_2F_2 system is freezing in the expansion valve. Some operators find it expedient in the case of expansion valve freeze-ups to add an alcoholic preparation marketed under various trade names. Most *compressor manufacturers will recommend the removal of the moisture* rather than an additive to combat the physical disadvantage of the moisture.

Moisture Quantities

Reputable refrigerant manufacturers make every effort to supply refrigerants with minimum moisture. CCl_2F_2 with a moisture content of ten parts per million is not uncommon. Perhaps to a good many, it may be difficult to visualize *ten parts per million.* Assuming that the weight of water and refrigerant is the same, ten parts per million can be described as being equivalent in size to an average size pea as compared to a regulation size basketball. Thus though we are talking about very small quantities of moisture, they are nevertheless perceptible. Even though it is quite difficult to keep the moisture content low, the effort expended will pay big dividends in extending the life of the compressor.

Recent literature on the maximum amount of water that can be tolerated in a system to assure freedom from corrosion gives figures from 15 to 300 parts per million. If a CCl_2F_2 system has 300 parts of moisture per million, a large portion of this moisture will appear as free water. A moisture content of 30 parts per million, however, will be completely absorbed by the refrigerant at evaporator temperatures above minus 20 F and will not freeze out at the expansion valve. Absence of expansion valve freezing does not always assure a dry system. Operators have reported extensive copper plating (without expansion valve freezing) at evaporator temperatures of minus 20 F. This observation suggests that copper plating can result from moisture concentrations of less than 30 parts per million.

Association with a great number of refrigeration operators has divulged an alarming attitude with respect to infiltration of air into refrigerant systems. Many maintained that *infiltration of air into refrigerant systems is not serious since it can be purged from the system with comparative ease. This attitude should be corrected because infiltration of air into the refrigerant system usually carries large quantities of moisture with it.* Unfortunately when the air is purged from the system the moisture remains. Repeated infiltration of air and purging will gradually increase the moisture content in the system. For example, *in an average three ton system in which a refrigerant dryer is employed, the infiltration of one cubic foot of average summer air will deposit sufficient moisture in the refrigerant system to saturate the three ton dryer at a moisture concentration in excess of the corrosion limit.* If a compressor is operating with a subatmospheric crankcase pressure for prolonged periods, the system should be checked frequently for the possibility of air infiltration. An elevated head pressure is the best known clue.

Moisture Protection

The first step in assuring a dry refrigerant system is to make absolutely sure that the new system has been properly dehydrated. This is done by evacuating the entire system with a good quality vacuum pump which can obtain a vacuum of at least 29.75 inches of mercury. The type of instrument used for measuring a vacuum is of considerable importance. The ordinary Bordon tube gauge (vacuum) is not sufficiently accurate at the high vacuums for this purpose.

The use of a refrigeration compressor is entirely unsatisfactory for the purpose of dehydrating a system by the high vacuum method.

The next important step in obtaining a moisture free system is to *charge the system with refrigerant that is known to be dry.* The use of refrigerant that has been withdrawn from a previous system can introduce large quantities of water, even though the refrigerant may be charged into the system through a liquid dryer. Wet liquid refrigerant passing through a dryer only once, will lose only a small percentage of the moisture in the refrigerant. Careful laboratory tests indicates that the dryer will not absorb its maximum amount of moisture from the system in much less than 40 hours of operation. Absorption of moisture by a refrigerant dryer, is a much slower process than may be suspected. For a maximum of safety, charge the system with refrigerant directly from the manufacturer.

Lubricating oil for the compressor crankcase should be charged into the compressor *from sealed airtight containers.* Lubricating oil left open to atmosphere can absorb large quantities of moisture.

Finally, a new *system should include a liquid dryer of sufficient capacity* to remove any moisture that may have entered the system in spite of the previous procedures. Dryer should be left in the system for at least 40 operating hours, at which time it has removed all of the moisture it can remove. A meticulous operator may want to know how much moisture is in the system. The dryer should be capped when removed, and sent to a laboratory equipped for such purposes, where an analysis of the dryer will reveal the quantity of moisture remaining in the system in parts per million. Some compressor manufacturers provide this service to dealers for a nominal charge.

Compressor Life

Naturally a customer would prefer to have a compressor last as long as possible and will be satisfied with a reasonable figure based on experience with other rotating equipment. For example, a compressor operating at 1750 rpm for 10,000 hours has made as many revolutions as an automobile engine which has travelled a distance of 300,000 miles. Few would run an automobile 300,000 miles before contemplating engine overhaul. With complete adherence to all of the known factors contributing to maximum compressor life, *compressors may be expected to operate longer than 10,000 hours before overhaul becomes necessary.*

A modern high speed compressor design incorporates replaceability features that will enable the owner to replace every wearing part in the compressor at a small percentage of the original cost. Thus, to answer the often asked question "How long will the compressor last?", one might reply, "As long as replaceable parts are available".

If a compressor is required to operate continuously, it can accumulate about 8700 hours in a single year. In the average air conditioning application from 4 to 10 years are required to accumulate 8700 hours of opera-

tion. A *desire* for 10,000 hours of life, however, is not a satisfactory substitute for conscientious, periodic inspection and maintenance. Occasional inspection of the internal parts of a compressor during periods of normal shutdown, will often prevent a serious failure at an inopportune time.

On compressors which use a force-feed lubricating oil system and which are equipped with an external oil pressure regulator, the condition of the bearings can be periodically checked without the necessity for removing the bearings. In any compressor equipped with a pressure regulator, it is the duty of this regulator to bypass that oil which is not required for lubrication. Obviously as compressor bearings wear, the clearance between the bearings and the crankshaft increases and the amount of oil required for the lubrication of the bearings becomes greater. In most cases, the lubricating oil pump is a positive displacement pump, and pumps the same quantity of oil if the speed of the compressor is not changed. With the compressor in operation at normal operating temperature, a calibrated needle valve which can be screwed into the opening provided for the oil pressure regulator, can be used to indicate the quantity of oil by-passing the bearings at the design lubricating oil pressure.

If during such a check, the needle valve is found to be open several turns, when establishing the design lubricating oil pressure, it can be assumed that the bearings are in good condition. However, if it is found that a needle valve has to be closed almost completely in order to maintain the design lubricating oil pressure, the operator can immediately become suspicious of either the bearing condition, the condition of the oil pump suction strainer, or the condition of the pump itself. If each observation is recorded once a year, the bearing condition can be studied periodically and a prediction can be made as to the expected life of the bearings. A sudden change in the observation would indicate an abnormality which, if investigated immediately, might easily prevent a serious breakdown at a time when full capacity is desired.

In conclusion, the manufacturers recommendations with respect to application and maintenance considerations should be studied carefully if the ultimate in compressor life is to be achieved. To increase the knowledge of operating personnel some manufacturers conduct technical schools at home offices and in the field which have helped to extend the life of compression equipment.

Food Section National Safety Council

A WELL attended meeting of the Executive Committee of the Food Section National Safety Council was held at the Edgewater Beach Hotel in Chicago January 27, 1954. It was attended by executive committee members representing breweries, food processors, frozen food packers, groceries, bakers, distillers, candy manufacturers and others.

Committee Reports

Dr. Rush, health director, indicated he would like to have the names of the various member companies who have medical doctors or directors so that he in turn could some day, as occasion warrants, correspond with them on some of the Food Section's medical problems.

E. F. Gomoll reporting for the Trade Association Committee said he was having considerable difficulty in arousing interest on the part of various members of this group.

F. T. McGowan, Visual Education Committee, was not present but sent a written report in which he asked that respective firms promote a plug toward trade advertising on safety. For example, get in a scene or two in various sales films or other promotional material.

Joe Redelberger, Engineering Committee reported little apparent interest on the part of the various members of this group, and indicated that they apparently will need the help of outside members in order to get work on some of their specific problems under way.

Frank Wirken reporting for the Bakers Division, said that only a small percentage of the members of this section are participating in the National Safety Contest. If worthwhile statistics are to be obtained, all firms should be encouraged to enter, certainly those companies that are members of the NSC. Further, after some discussion the Executive Committee through the Secretary was authorized to write to the National Safety Council on behalf of the Bakeries Division and request that a separate section be established, separating the bakeries from the prepared food manufacturers in determining the eligibility of the respective groups for the National Safety Council contest.

Joe Renner reported for the Brewers Division that the safe practices pamphlet on which they had been working for some time had now been prepared and is to be forwarded to the National Safety Council headquarters.

For the Canners Division, R. Campbell reported that letters have been sent out to all members, but relatively poor response has been obtained.

Burton May reported for the Confectioners Division that there was continued interest by the members of this group but that they were having difficulty in finding a prospect for leadership.

Vic Hendries, representing W. P. Johnson, chairman of the Beef and Dairy Products Division, reported that they were going to work on developing teaching aids or finding ways and means to associate principles of safety to job instruction.

James Snyder for the Distillers Committee reported they are working on a supervisory training program for the distillers group.

Ice, Cold Storage, Locker Plant Division

W. F. Leonard, Jr., Ice, Cold Storage Lockers Plant Division, though absent, sent a long telegram citing some of the continuous promotional work he has been doing.

Gregg Meyers, Program Director, reported on the proposed program for the 1954 National Congress and there was much discussion involving the various points of the program. This will be further developed at the Executive Committee meeting next May in Washington. At this time it was decided that the meeting would be held in Washington in conjunction with the President's Conference on Occupational Safety, also scheduled for the capitol city that week and that the meeting will be held May 6 and 7 and that those interested in attending can make a hotel reservation by writing to John McMurtagh, sales manager of the Sheraton-Park Hotel.

Milwaukee Council Bans Abandoned Refrigerators

THE Milwaukee, Wis. common council has adopted an ordinance making it illegal to leave a refrigerator anywhere where children could lock themselves inside. The ordinance makes it illegal to leave one outdoors unless the lock on the doors or the doors have been removed. Violators are to be fined $100 or given a 90 day jail sentence for each day that the violation continues. The newspapers in many states including Wisconsin have told of many children having suffocated in abandoned refrigerators in the past few months.

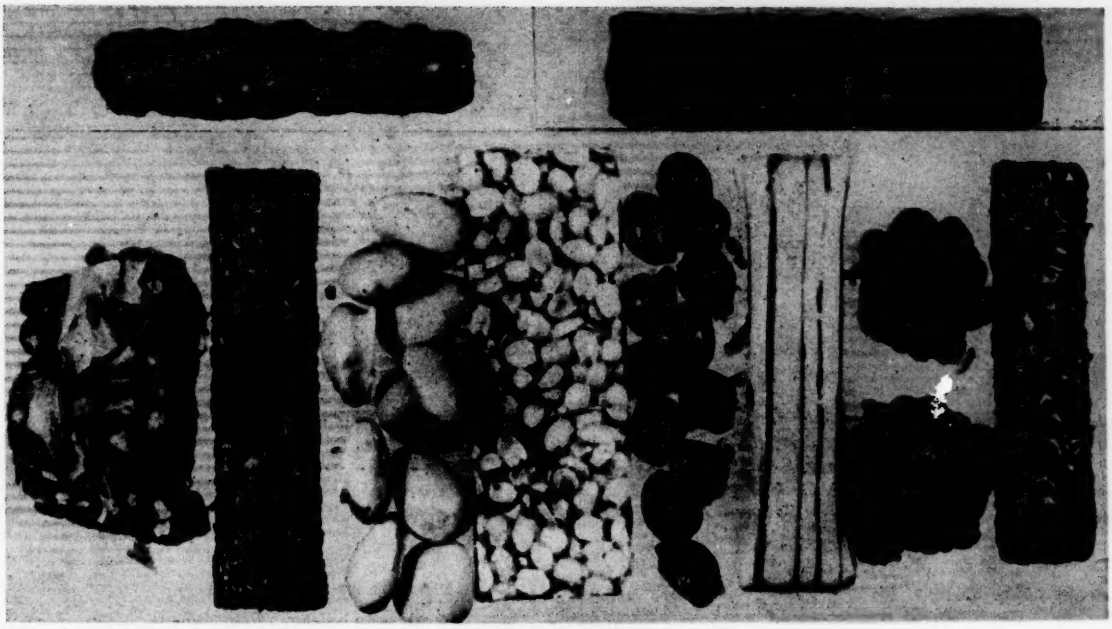


Fig. 1. Ten of the varieties of peanut candies used in the study on the effect of refrigeration. These include peanut brittle, chocolate coated peanut clusters, chocolate coated peanuts, pan coated peanuts, peanut roll bars, and spun peanut butter bars.

REFRIGERATING PEANUT CANDIES

Retards staleness and rancidity and preserves the fresh color, aroma and flavor, and prevents insect infestation. Results of study conducted by Georgia Experiment Station.

PEANUT candies may be kept fresh for as long as two years when properly packaged and stored at 0 F, according to Barbara Cowan and E. K. Heaton, of the department of Food Processing of the Georgia Experiment Station. They found that when temperatures above 0 F were used the storage life was proportionally shorter. For example, peanut candies stored at 32 F and 50 percent relative humidity, remained good for one year; at 50 F the storage life was about half this long, and at 70 F it was reduced to a few weeks.

Experiments Completed

A series of experiments under the supervision of Dr. J. G. Woodroof in cooperation with the National Confectioners' Association and The Refrigeration Research Foundation, extending over a period of five years, and including more than 20 kinds of peanut candies stored at temperatures ranging from minus 10 to 100 F, has just been completed. These tests indicated that refrigeration may be used to great advantage in retarding staleness and rancidity; preserving the fresh color, aroma, and flavor, and preventing insect infestation.

These results are particularly important since approximately 120 million pounds, equivalent to 21 percent of all edible grades, of peanuts are used annually in candies. These authors stated that not only are peanut

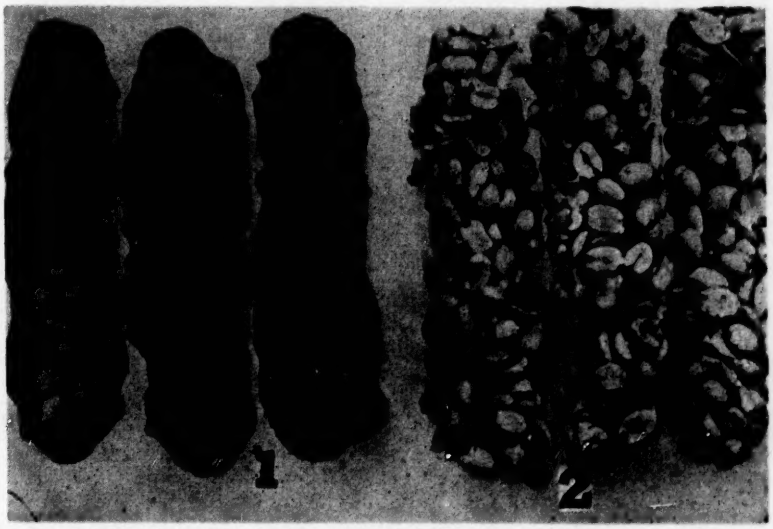


Fig. 2. The shelf life of chocolate coated peanut roll bars (1) was 60 to 80 percent longer than the uncoated (2) because the coating protected the peanuts from oxidative rancidity, and masked the flavor of slight rancidity.

Published as Georgia Experiment Station paper, Journal Series No. 250.

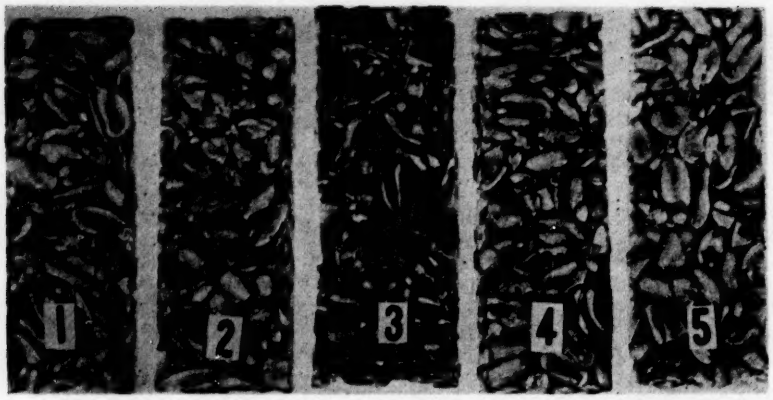


Fig. 3. Showing the changes in color of glazed peanut brittle bars when stored at temperatures ranging from minus 10 to 100F for nine months: (1) at minus 10F, no change; (2) at 70F, slight darkening; (3) at 100F, severe darkening; (4) at 70F, alternating with 100F, at two week intervals, considerable darkening; (5) at minus 10F alternating with 100F, considerable darkening.

candies among the most preferred in flavor, but they contain appreciable quantities of proteins, fats, and B Vitamins.

General Conclusions Difficult

These workers pointed out that it was very difficult to draw general conclusions since peanut candies varied widely in ingredients and shelf life. Peanut brittle was found to be the least stable of the candies studied because of sensitivity to rancidity and darkening at high temperatures and to absorption of moisture causing stickiness at high humidities. The most feasible conditions for storing these candies was found to be 32 to 34 F, at 45 to 50 percent relative humidity, in an odor-free atmosphere. It was found more important to keep peanut brittle and spun peanut butter bars at low temperatures and low humidities than most other peanut candies.

Peanut butter taffy kisses were less sensitive to environmental conditions due largely to the fact that each piece was individually wrapped. Chocolate coated peanuts, peanut roll bars, and pan coated peanuts were much more stable due to the protection of the peanuts by the heavy chocolate coating. Also, slight staleness or rancidity was masked by the chocolate flavor. It was found in these experiments that the shelf life of peanut candies was extended from 60 to 80 percent by a coating of either milk or "cocoa type" chocolate.

Moisture Content

Most of the candies tested had a moisture content of three percent or lower, and there was a tendency for them to gain moisture during storage. This was especially true with uncoated candies such as peanut brittle and spun peanut butter bars. Moisture increases were prevented by maintaining a relative humidity in the storage room of 50 percent or lower and by use of moisture-proof packages.

Fig. 4. "Cocoa type" pan coated peanuts remained acceptable for 12 months at 32, 70, and 70F alternating with 100F when sealed in double-wall cellophane bags, whereas when packaged in small chipboard cartons they were unacceptable after 24 months at minus 10F, 11 months at 70F, and 3 to 6 months at 70F alternating with 100F.

Adequate Packing Necessary

Adequate packaging was found necessary to maintain proper appearance and texture in peanut candies even for short time storage and was more important for long time storage. Wrapping individual pieces of candy or overwrapping boxes of candy, with aluminum foil, or with one of several types of transparent flexible wrapping materials, was effective in preventing peanut candies from gradually taking up moisture during storage, and in preventing condensation of moisture on the surface of the candies on removal from refrigerated storage.

Numerous tests showed that even delicate candies did not "sugar bloom" or show other effects of moisture condensation, when properly wrapped before storage, and if they remained unopened upon removal from storage until the temperature of the candy reached that of the surrounding atmosphere.

In these experiments, no benefit was found in the use of zein coating for peanuts before being placed into the candies, or in the use of an antioxidant (butylated hydroxyanisole) for retarding rancidity.

There was some indication that chocolate coated peanut candies became soft, sticky, and "wet" at a slightly lower temperature than similar candies without peanuts. This was interpreted as being an indication that the oil in the peanuts migrated through the chocolate coating to the surface.

There was no injury to peanut candies by freezing except slight cracking of the outer coating of spun peanut butter bars and cracking of honeycomb chips containing peanut butter. It is not recommended that these two types of candy be stored below about 20 F.

Navy Increases Use of Orange Juice

THE Navy is expected to substantially increase its consumption of frozen orange juice concentrate, as a result of a redefinition of Navy provisions governing the amount of orange juice which could be served to personnel. Before frozen concentrate had been designated a major citrus product, Naval regulations allowed serving only 2.4 oz. of juice per person every three days. The new ruling allows six ounces per man per day—seven times as much. Florida Citrus Mutual says the Navy could utilize more than 3,000,000 gallons of frozen orange juice concentrate annually.—Cold Facts.

New Trawler Freezing Unit for Shrimp

THE shrimp fishing industry in the Gulf of Mexico is watching with much interest the progress of a new freezing unit now being tried out in the trawler "Trade Winds" which belongs to the Ambos Co. at Thunderbolt, Ga., a fishing and fish-processing village on the Wilmington River bluff just out of Savannah. A news report states that the Trade Winds is fitted out with a compact freezing unit designed and installed by Mingledorff's, Inc., of Savannah.

The freezing unit, which has been given the trade name, Hydro-Freeze, has already had a highly successful test run in the Trade Winds, operating out of Thunderbolt. But the long run from Tampa down through the rich fishing grounds off Mexico and Central America is the first commercial use of the Hydro-Freeze.

This sturdy freezing unit, according to people in the seafood business could revolutionize the fishing industry. It's the old story of supply following demand. For decades, even the operators of the larger shrimp and fishing fleets working out of the rivers that thread Chatham County (Savannah) have confined their range to the South Atlantic Coast. But in the last two years such rich strikes have been found off Honduras, Nicaragua and the fabulous Campeche that Savannah vessels have been ranging far from home port. Larger trawlers were built, and are being built.

But the crucial problem was one of preserving the huge catches until the trawlers could make their rounds and put back into port—a matter of weeks, sometimes. It was a problem apparent and intriguing, to W. Lee Mingledorff, Jr., whose family owns the Savannah Machine and Foundry Co., which works primarily with ships. Mr. Mingledorff, however, was in the refrigeration business. The firm set out to solve the problem.

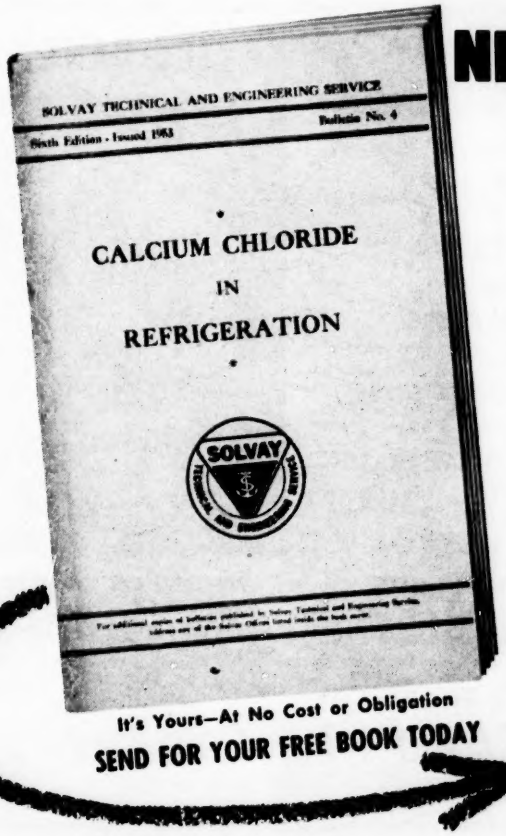
One of the first steps was to hire W. H. Carpenter, a Georgia engineer who had been for many years in the employ of General Motors. Mr. Mingledorff gives much credit to Mr. Carpenter for the two types of seagoing refrigeration the company has evolved and installed.

The first type was designed to take care of the refrigeration needs of the smaller boats which make shorter runs, frequently putting out at dawn and returning on the next good tide after the holds are filled with shrimp. This was not a freezer but a refrigeration unit, patented as Hydro-Cold. The unit is small, uses a system of tanks and sea water, and has proved efficient.

The second type, the Hydro-Freeze, took longer to work out because it actually freezes the catch. But, as installed and operating, the unit freezes the shrimp within 40 minutes after they are caught, including the time it takes the crew to sort the shrimp from the other sea creatures which come up in the nets. The actual freezing takes only 15 minutes. Since the shrimp are kept frozen from then until marketed or processed, Mr. Mingledorff says, "they will be in the most perfect quality of any shrimp landed today from catches made any distance from home port."

Correction

AN article on the Beatrice Foods—K & B Packing plant at Denver, Colo. should have stated that the plant complete, including the refrigeration machinery and the automatic system, was engineered, designed and installed by Felix W. Powers, Powers Refrigeration, Los Angeles, California, refrigeration distributors of Carrier Industrial Refrigerating Machinery.



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Says Ice Users Not Ice Men Cause Contamination of Ice

THE man who recently accused crushed and cubed ice of being a potential health hazard may be a nice chap, with lots of scientific savvy. But he's not an iceman—and there's the rub, or the slip. Stepping forward to speak for the icemen in rebuttal was Peter F. Hogan, president of the New England Ice Dealers Association, a director of the National Association of Ice Industries and president of the Liberty Ice & Fuel Co., of Springfield, Mass.

V. D. Foltz, of the Kansas Agricultural Experiment Station, writing in Public Health Reports, had said tests often find ice carrying germs inviting food poisoning or diarrhea. They also find sand, threads, bits of finger nail polish and insects, and other debris in sediment from melted crushed or cubed ice.

Said Mr. Hogan: Foltz's statement is "another uncalled-for criticism of the purity of iceman's ice . . . He admits that the ice is usually pure when manufactured. His criticism is in the handling of the ice after it is delivered to the purchaser. Why select ice to pick on when any product handled as he describes would receive the same accumulation of undesirable qualities?"

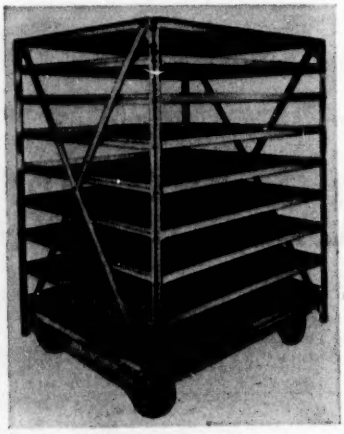
He continued: "May we state that records from the National Ice Association research division show that no epidemic of any kind has ever been traced to iceman's ice, which is considered by the Food & Drug Division as one of the purest items under their control. Iceman's ice in many sections of the country cannot be made from ordinary city drinking water, but must pass through a set of from one to three filters in order that impurities and minerals may be removed. Even then the core of the frozen cake is drawn off to remove any possible additional impurities, too minute to be caught in filters. The empty space is then filled with distilled water.

"In the modern ice plants, crushed cubed and sized ice is not touched by human hands, but passes from the freezing tank into crushers and cubing machines and then into waterproof bags which are sealed or wire tied. Therefore, we have a germ-free product. Once this ice is delivered to the purchaser, the manufacturer's responsibility ceases, as it would if the product was meat, vegetables or ice cream. However, we should also realize that the articles referred to in Mr. Foltz's article are accumulated from without and not within the ice. It must also be remembered that as ice melts, many types of foreign matter would be washed away. This would not be true in careless handling of foods.

Iceman's Ice Is Pure

"In replying to Mr. Foltz's article, we are referring to iceman's ice made in a modern ice plant. We do not refer to ice making machines or refrigerators, which contain food odors or lack proper filtering and agitating. The industry does not find fault with the statement that foreign substances may have been found in the samples he collected, but we do disagree with his inference that the ice was at fault. There is a great deal of difference in many a manufactured product and its ultimate condition when presented to the public, due to good or careless handling. Place the criticism where it belongs—the methods used by the purchaser after the ice company has delivered the ice.

FREEZER TRUCKS



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Kansas-Oklahoma Ice Convention

TO review developments of 1953 and have a look at 1954 the Oklahoma and Kansas Association of Ice Industries met in annual convention at Oklahoma City, January 17, 18 and 19. The meeting was profitable and enjoyable to all.

There were no long speeches on the program. Paul H. Andres, president of the National Association of Ice Industries, gave a short and inspiring talk; Guy W. Jacobs, Executive Secretary of the National Ice Association reported on the national work. W. F. Leonard, Jr., gave an illustrated talk on safety from which all who were there got a lot of help.

The ladies all enjoyed a party at the Governor's Mansion at which Mrs. Johnson Murray, the first lady of Oklahoma, was hostess.

The 1953 Kansas officers were all re-elected for 1954 as follows:

President, Thomas Carroll, Wichita.

Vice-president, W. L. Shanton, Topeka.

Directors: Ed. Hund, Beloit; H. H. Bettis Pratt; R. L. Garrison, Ellis; Paul Hoffman, Abilene.

The secretary's office has been moved to the general office of the Newton Ice Company, Newton, Kansas.

Kansas is more or less expected to be the host association for the meeting next year. If Kansas members will turn out like the Oklahoma members did and Oklahoma does as well as this year, a very successful convention will be held again next year.

Southern Ice - Georgia Joint Convention

THE joint convention of the Southern Ice Exchange and the Georgia Association of Ice Industries held at Atlanta, Ga. February 23-24 was well attended and an interesting program, including panel discussions was given.

Southern Ice Officers

Southern Ice Officers elected for the coming year were:

President, M. E. Pittman, McRae, Ga.

Vice-President, B. W. Franklin, Birmingham, Ala.

Georgia Officers

Officers elected by the Georgia Association were:

President, William C. Buck, Columbus

Vice-President, Homer McGowan, Marietta

Chairman Board of Directors, Willard T. Adcox, Dalton

Richard W. Florrid was re-elected secretary-treasurer of both associations.

Eastern States - Virginia Joint Convention

A JOINT convention of the Eastern States Ice Association and the Virginia Ice Manufacturers' Association will be held at the Lord Baltimore Hotel, Baltimore, Md., on April 22 and 23, 1954. Charles Hoffberger of C. Hoffberger & Co. of Baltimore, was again chosen chairman for the convention and he and his committee are now planning a program of business sessions and entertainment that will be of interest to all who attend.

Bumper-Step Cuts Accidents

A NUMBER of Canadian icemen have found that it pays to equip delivery trucks with a combination step-bumper at car bumper height. This bumper materially reduces the number of crushed grills, smashed fenders and dented hoods. Consequently, it reduces accident claims!

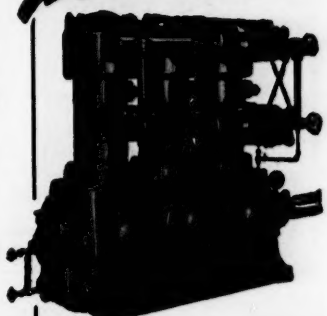
The Case of the Contented Engineer

By Howe . . . The World's Chiller

John Q. Engineer was pleased with his old refrigeration system. Been giving him pretty good service . . . off and on. Of course, the cost of operating it was going up, but what expense wasn't? Had some downtime lately, but then you have to expect that, too!

Then one day, a Howe "private eye" detected the trap that "J. Q." was walking into, and pointed out those unseen losses that were robbing him of his real profits. He showed him how to cut the risk of spoilage, assure better production, keep his products at their perfection peak. By providing exact temperature and humidity control at *all* times with Howe tested equipment, "J. Q." soon realized his obsolete, inefficient system had been robbing him *cold.*

He also realized that his new Howe kept running longer, with less trouble. "They're designed for that from the start, backed by 42 years' specialization," said the "private eye," departing for his next case.



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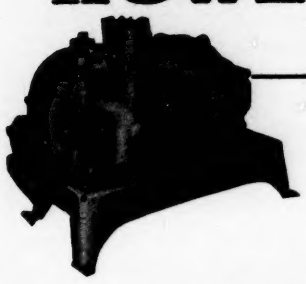

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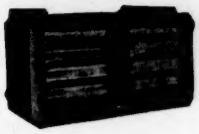

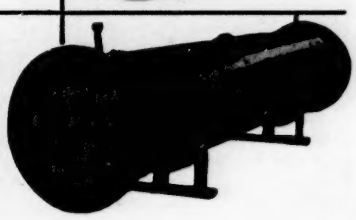

Practical Refrigerating Engineer

NATIONAL ASSOCIATION PRACTICAL REFRIGERATING ENGINEERS

Cold Storage Warehousing in New Zealand

These large refrigerated storages and meat plants on the Auckland waterfront handle locally produced products for export, mostly to British Markets.

WM. J. SYME
Superintending Engineer
Auckland Farmers Freezing Co. Ltd.
Auckland, New Zealand

THE port of Auckland is the largest in New Zealand, and at present, all the frozen meat (including chilled beef) and dairy produce handled by The Auckland Farmers Freezing Co. is exported through this port—mostly to Britain. The company's two large refrigerated stores on the Auckland waterfront handled for export in the 1952-53 season, 300 million lbs. of butter, 1,800,000 lbs. of cheese and 280,000 lbs. of apples. The three meat packing houses operated by the company slaughtered for export in the same season, 800,000 lambs, 320,000 sheep, 100,000 hogs, 80,000 cattle and 450,000 young calves. These figures, of course, do not include meat and produce handled by the company but required for local consumption.

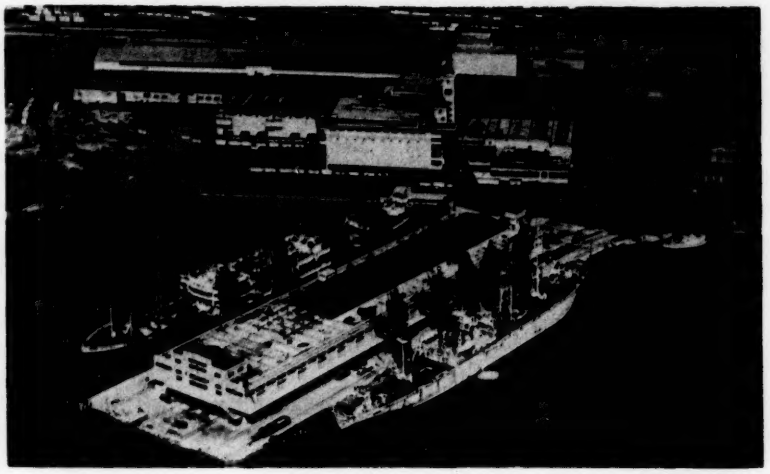

Fig. 1—Export Wharf Cold Storage, The Auckland Farmer's Freezing Company, Ltd., Auckland, New Zealand. Building connected by covered conveyor to wharf stores million pounds butter.

Butter Storage

Fig. 1 gives a general view of the main butter storage at Auckland, containing 1,200,000 cubic feet in six refrigerated stories. The evaporators are contained in the seventh floor, immediately below the company's head office. Refrigeration is effected by cold air circulation through continuous vertical ducts inside east and west external walls, with a central duct serving all floors.

Brine Spray Cooling

Air is cooled by calcium brine sprays placed between successive banks of flooded ammonia coils standing above brine tanks. Eliminators preclude carry-over of brine, and sliding doors permit reversing direction of air circulation without reversing air flow through the battery of coils. No defrosting is necessary under this system, the moisture being continually removed by concentrating the brine.

The project was completed in 1939, and within a few years, a 400,000 cubic foot 3-story annex was built alongside. Butter is handled in and out all floors, by means of 16 swing tray elevators, discharging to roller chutes and belt conveyors. A belt conveyor system delivering from the store to the export wharf shown in the photo is also in use, eliminating the use of transfer trucks to this pier.

Compressing Equipment

A view of the compressor room equipment is given in the Cover picture. Shown are two 400 hp 273 rpm 3 cyl 16½ inch dia x 12 inch J. & E. Hall ammonia compressors. One 240 hp 360 rpm 4 cyl 10½ x 9 inch Sterne compressor is always available as stand-by. There is also a small two-stage Brotherhood for pump-out and miscellaneous duties. Two-stage sea pumps provide adequate 70 F maximum temperature water for shell and tube condensers.

Fig. 2 is a view of the western facade of King's Wharf Cold Storages

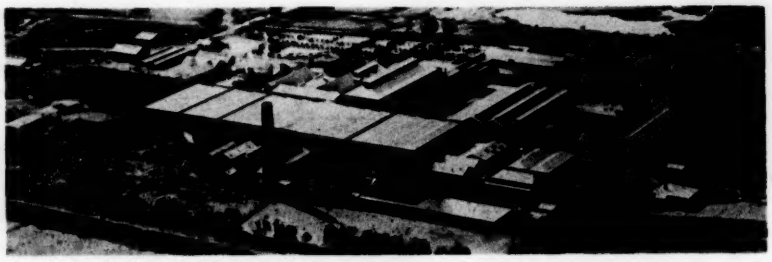

Fig. 6—Horotiu Works, Waikato district, Auckland Province, a meat slaughtering and freezing plant, one of 35 in New Zealand.

EXECUTIVE OFFICE, N A P R E
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Chicago 44, Ill.
OFFICERS
President, L. J. Vivien,
New Orleans 22.
Secretary, J. R. Kelahan, Chicago 44.

Operating engineers of all refrigerating plants are invited to affiliate with the National Association of Practical Refrigerating Engineers, an educational association.

situated a few hundred yards from the Export Wharf Stores. These buildings were erected at various dates between 1886 and 1934, and contain some 2,000,000 cubic feet of refrigerated space which is used largely for export butter, cheese and apples. Storage for local requirements, including frozen foods, is also provided at this point.

Electric Drive Replaces Steam

The refrigeration compressors at this plant provide an interesting contrast between the old and the new. Two compound steam driven duplex compressors which carried the load for many years are shown in fig. 3. Rising costs of production of the only available cheap fuel, local sub-bituminous coal and the availability of ample hydro-electric power has brought about, during the last 20 years, a change-over to electrically driven vertical reciprocating compressors. Fig. 4 shows the group of Sterne compressors which now carry the load of King's Wharf Cold Stores, the old steam driven machines being retained as stand-by in case of disruption of the national supply of electric-power.

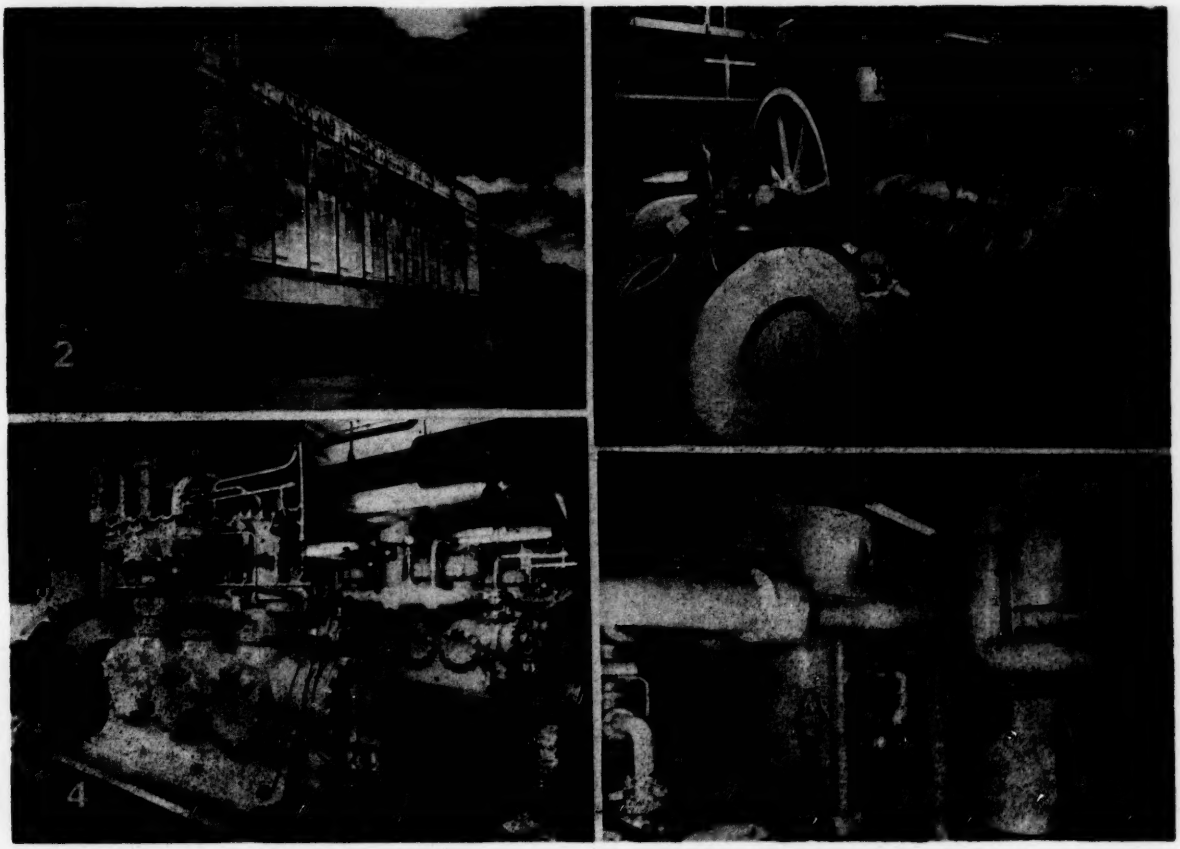
The refrigerating plants described in this article, operated by the Auckland Farmers Freezing Company, Ltd., are located in the Auckland Province in the northern part of the North Island of New Zealand. Mr. Syme, the author, is an NAPRE member and attended the convention at Purdue University in November.

Typical of ammonia separator vessels installed at the company's plants are those shown in fig. 5. The larger receives suctions from freezing rooms and 0F stores, both direct expansion rooms and brine battery coils; while the smaller vessel receives suctions from chiller rooms at a much higher suction pressure, around 30 psig. Liquid ammonia pumps below these vessels supply sub-cooled ammonia to the expansion valves and make-up is admitted from the main liquid receiver through float valve protected by solenoid valve.

Freezing Works

A typical meat packing house, or a "freezing works", as popularly known in New Zealand, is shown in fig. 6, which is an aerial view of the Horotiu Works in the rich Waikato farming district 70 miles south of Auckland. Since most of the production is exported to Britain as carcass meat, a feature of New Zealand packing houses (in contrast to the U. S. packing house) is the large amount of refrigerated space necessary for storing frozen carcasses. When it is realized that a modern refrigerated ship may contain up to 500,000 cubic feet of refrigerated space, it is not surprising that New Zealand packing houses, such as Horotiu Works, have to provide two million cubic feet of space to take care of variations in shipping schedules.

This plant is located in a typical rural section of the farming districts which occupy about one-third of the total area of the Islands of New Zealand (104,000 sq. miles). The rest is, for the most part, alpine, mountainous, or too rugged and forest-clad for



View of the Auckland, New Zealand, refrigerated storage operation: Fig. 2—King's wharf cold stores. This plant has 2 million cubic feet capacity. Frozen foods, apples, cheese and butter are stored here. Fig. 3—King's wharf obsolete compound steam driven duplex 18 x 36 inch, 70 rpm ammonia compressor. Fig. 4—New Kings' wharf equipment. One 3-cylinder and two 4-cylinder Sterne compressors of 360 rpm, 10½ x 9 inch design Fig. 5—Ammonia separator vessels typical of those in use at the Farmer's Freezing Co.

farming purposes at present. Meat and wool production from a sheep population of 35 million and a cattle population of 6 million account for nearly 70 percent of export values from New Zealand ($480,000,000) The slaughtering, dressing of meat, and processing of by-products is carried out in 35 similar plants to Horotiu dotted over the country. It is no wonder then that the meat packing business is often referred to in New Zealand as the "Freezing Industry".

News Notes and Chapter Activities

Los Angeles

FRED HERR

A SPECIAL program dedicated to and designed specifically for members of the meat industry attracted the large attendance at the March 3 meeting. The program theme was "Refrigeration In The Meat Industry," and included three speakers noted for their knowledge of meat refrigeration. The program was arranged by Educational Chairman Larry H. Benedict with the collaboration of Vice-president Elmer A. Johnson. Invitations were sent to the executives and refrigeration engineers of all meat packing plants in the Los Angeles area.

Speakers included D. J. Thompson, Gay Engineering Corp., R. E. Ristow, Refrigeration Machinery Corp., and Charles Shapiro, International Refrigeration Engineers. Each discussed an assigned subject, and in addition, Mr. Shapiro presided over a question-and-answer period following. Mr. Thompson discussed heat gains and air distribution in meat packing plants, and covered the subject of meat industry refrigeration requirements. "Around 1940," Mr. Thompson said, "the meat plants began to convert from the deck system using direct expansion or brine systems, to the unit-type cooler system. Swift & Co. was the first to change-over."

The speaker pointed out that since 1943 temperatures in meat packing plants have gone down. Whereas 45 to 50 degree F temperatures were in vogue a dozen years ago, the demand today is for systems of 32 or 33 F. and storage plants to as low as minus 10. A disadvantage of the old brine deck system was its tendency toward dehydration, since salt itself is a dehydrator. He stated that another reason for the passing of the deck system was its cost of construction. A 20-ft. ceiling was mandatory in a deck system, while 15-ft. or less ceiling heights are practical under present techniques.

Mr. Thompson declared that although most other industries are going to forced air circulation in refrigerated rooms, the meat industry shows a reversal of this trend, because forced air circulation is not practical in all rooms of a meat plant. He cited hog rooms as one of the exceptions. The speaker discussed such phases of meat plant refrigeration as cooling and humidity requirements of beef, pork and lamb, as well as the western and eastern chilling temperatures for those products.

He stressed humidity control as a primary factor in proper refrigeration in meat plants. We now must design systems that provide humidity up to 87 to 92 degrees. While conceding that the majority of meat plant refrigeration engineers are aware of and conversant with humidity needs, Mr. Thompson declared that management executives still are inclined to minimize the vital part humidity plays in their operations. "Superheat and slop-over are two of the evils of a refrigeration plant. Too many young men now entering the industry," the speaker related, "do not know why those things occur. They are not phenomena. There are simple, practical reasons why a machine overheats or a unit overflows. The staff men should be taught to know the cycles of refrigeration."

Mr. Ristow followed with a resume of equipment needs in the meat packing industry. The concluding talk was given by Mr. Shapiro on controls, in their specific applications to meat cooling and refrigeration.

Chapter president Frank Eccleston presided over the business session, which preceded the educational program. A new member, Ellis G. Scott, was inducted. Alexander M. Shears, refrigeration instructor, Los Angeles Technical Jr. College, directed the preliminary class on the subject "Heat Calculations."

View of Preliminary Class in action at Los Angeles Chapter, NAPRE. At the blackboard is Alex M. Shears, the chapter's instructor, who also serves as instructor in refrigeration at the Los Angeles Technical Junior College. Picture by H. H. Gilmore.

W. R. Burnett who headed the membership committee through three successful drives functioned in his old role by reporting on membership activities. The figures revealed that 15 new members had been corraled as of March 3. The Independent team had reported nine and the Union Ice-Coal Consumers 6.

At the February 17 meeting, Glendon D. Ball, Albert Cohen, and H. A. Friedenberg, a reinstatement, were accepted into membership. The financial report for the past fiscal year was presented by Treasurer E. T. Quinn. Speaker at this meeting was Ted Schroeder, Vice-president, Kold-Hold Pacific Company, who talked on "Short Haul Truck Refrigeration" and answered questions at the conclusion of his talk.

Olympia

FALCONER ANDERSON

HERE'S the greeting that NAPRE's newest chapter received in the Olympia Brewing Co. house organ:

B-r-r-r, it's cold—
NAPRE keeps it that way.

New Group Formed

NATIONAL in scope, the new association is composed of men interested or engaged in practical refrigeration problems.

ASSOCIATION with men who know the field of refrigeration will have lasting results for all.

PRACTICAL aspects will be emphasized on all problems and phases of refrigeration including electrical and construction.

REFRIGERATING being one of the more precise operations in brewing, it was perhaps only natural our livewire engineering department formed a local chapter.

ENGINEERS in our entire community, who formerly journied to Tacoma or Seattle for knowledge and friendship available through NAPRE, will go for a local chapter in a big way.

The first meeting of the Olympia Chapter was held at the plant Friday, February 5. Election of officers was held. Serving one year: Al Giles, president; Chuck Devine, vice-president; Gordy Cochrane, secretary-treasurer.

Al stated there were 17 men present and he expects a much larger turnout when news gets around. He emphasized one point: You don't have to be an engineer to be a member. If you want to learn refrigeration or increase your knowledge, by all means come to one of the meetings, held the third Tuesday of each month.

Colton

HARRY BONTER

ON February 10 this chapter met at the Santa Fe Ice Plant lunch room, San Bernardino, Calif. C. H. Purkiss introduced A. C. Goodsite, manager, Pacific Telephone and Telegraph Co., Colton, Calif., and the speaker, William Richards, Los Angeles, who gave a live demonstration and a very interesting talk on Micro Wave installations and uses. He demonstrated how television and messages were transmitted across the nation. Two miniature towers were set up. A record was played and transmitted from one tower to the other. He also showed how Micro Waves are bent, the same principle as bending light waves with glass rods, or a special silver tube to transmit micro waves at different angles.

Other guests attending the meeting were Mr. Thorburn, manager, General Telephone Co., San Bernardino, L. G. Lynn, president of the local RSES chapter, Leonard A. Jones, secretary, RSES and several of their members.

J. H. Mairs was refreshment chairman and proved his ability at the end of the meeting. Chas. Allen Davidson withdrew his membership. This 73 year old active member is retiring and relocating to another city following the loss of his wife.

New Orleans

DAN BEHRE

THE regular meeting of the Louisiana Chapter No. 2 was held in the Roosevelt Hotel February 10, presided over by president Frank Chase. John Luck continued instructions from the Guy King course on the subject of heat transfer. His discussion was mainly on formulas used in calculating heat transfer. Due to the Mardi Gras season with its accompanying parades and balls the chapter dispensed with the regular meeting scheduled for February 24, 1954.

It is with sorrow that the Louisiana chapter was informed of the death of Charles Albin Anderson, chief engineer, New Orleans Cold Storage. Mr. Anderson was a past president of Louisiana No. 2, and will be remembered for his presentation of more than one paper at national conventions. This past year he received a citation for 30 years of continuous membership. Members will recall his good fellowship, and counsel on plant construction and maintenance.

Officers and Committee Chairmen of New Orleans Chapter: Standing—Max Sofer, Julius Prager, Addison E. Wegener, National Past President and 1954 Convention Chairman, John Luck, Chapter Instructor, Jas. Chaisson, Vernon Foret, John Mariakis, Marion Olivier, and Frank Gillio. Seated—Joe Vernaci, sgt.-at-arms, Eugene Orth, financial secretary, Damian Fischer, 2nd vice-president, Frank Chase, a National Director and Chapter President, Leon Vivien, National President and Chapter Secretary, Milt Mancuso, 1st vice-president, and Bart Mancuso.

Members-at-Large

LEROY ETZEL

CONTINUING our plan to acquaint the entire membership with NAPRE's members-at-large, (those boys who go it alone), I would like to introduce these members from Ohio: C. A. Frampton, chief engineer, Burkhart Brewing Company, Akron; Robt. C. Hogan, chief engineer & Wm. L. Morris, engineer for Canton Provision Co.

Traveling east to Elmira, N. Y., a member could meet eight members-at-large with the Hygia Refrigerating Co. They are, W. C. Wolgast, secretary; Wm. E. Murphy, superintendent; Robert Comfort, chief engineer; his assistant, Alfred Tillsley; James T. Lewis and Stephen H. Greatsinger, the operating engineers; LaVerne W. Knowlden and John Ring, the relief engineers. How about a Chapter there, fellows?

Before leaving New York, let's introduce Martin J. Schermer, custodian engineer, New York City Board of Education. Now swing southwest for a Texas visit at Lubbock. Meet E. A. Tipton of Risinger & Tipton; Carl Nessler Jr., general manager, Artesian Ice & Cold Storage Co. Texas City; S. G. Galvan, chief engineer, Southern Texas Ice & Service Co., Crystal City, Texas; Dean Emerson, president, MMM Inc., who is busy reviving the Houston Chapter.

Members-at-large over in Oklahoma include: Fletcher Kysar, engineer, Railways Ice & Service Co., Waynoka; T. V. Woodward, vice-president, Anadarko Ice & Cold Storage Co., and Walter Brittain, manager, Crystal Ice Co., Ardmore. In Colorado you would like to know H. C. "Dutch" Diehl, director and secretary of the Refrigeration Research Foundation at Colorado Springs (Dutch is a former member of the California Chapter No. 1, San Francisco); J. Bruce Espy, secretary-treasurer, City Ice Co., Denver; and Eruol L. Green, refrigerating engineer, A. T. & S. F., LaJunta, one of our newer members.

Meet Alvin G. Hubbard, chief engineer, Arizona Ice & Cold Storage Co., Tucson; Raymond J. Griffith, engineer of National Ice & Cold Storage Co., Petaluma, Calif.; C. B. Ferguson, vice-president of Puritan Ice Co., Santa Maria, Calif.; and Prof. Harold P. Hayes, Dean of Engineering at the Calif. State Polytechnic College, San Luis Obispo.

Want to go to Alaska? Look up Cletus Burger, Refrigeration Shop, USAFB, Anchorage, and Frank D. Montgomery, engineer, Sitka Cold Storage Co. Or, if you prefer Hawaii this time of year, visit with Walter E. Wilkinson, chief refrigeration engineer, Hawaiian Tuna Packers Ltd., Honolulu, or Cameron W. Deal, refrigeration mechanic, Marine Corps Air Base, Lanikai.

Memphis

CHAS. CONLEY

AT the February 3 meeting the chapter instructor H. L. Todd lectured on refrigeration and relative humidity. He explained the effect of humidity on products stored in refrigerated structures, he showed how humidity is measured, and what instruments to use. E. J. Todd, assistant engineer, B. Lowenstein Bros., was elected to membership.

At the meeting on March 3, Todd used the black board to work out the compressor for a given load condition. He also showed how compressors could be installed to handle various temperatures and sizing the compressor for such loads. How the various refrigerants affected the compressor capacity were also discussed.

Stockton-Modesto

HARRY DYER

THE educational chairman for the chapter, C. C. Berkeley, is continuing with G. R. King's course on refrigeration. At present we are studying section 8, and find it quite interesting and useful since it covers operation and servicing of refrigeration machinery. Our meeting of March 3 was held at Pacific Fruit Express Co. plant, Modesto. Thus far, our chapter has taken in four new members and reinstated one.

February 10 meeting of San Francisco Chapter. Officers pictured are: Vice-presidents Henry Guilmette, Pacific Scientific Company and Howard Boudreau, Cyclops Iron Works; President Frank Cardoza, Battery Street plant, Golden State Company Ltd.; Treasurer, Charles Stewart, Guerrero Street plant, Golden State Company, Ltd.; Sergeant-at-Arms Fred Imsand, Spreckles-Russell Dairies; Secretary Lewis Brooks, Carrier Corp. Harold A. Halls was the guest speaker, lecturing on water defrost advantages to the refrigerating engineer.

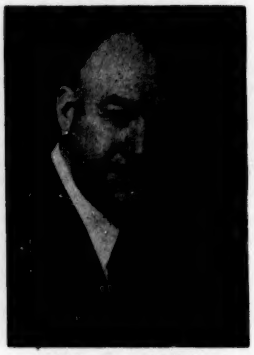
Dallas

GEO. STEWART

ON February 15, L. P. Reiss, consulting engineer, conducted the refrigeration lesson, briefly covering absorption systems. Then on March 1, E. R. Hallowell conducted a review of the first section of the refrigeration course. Plans were confirmed for the field trip to Lone Star Gas Co. on March 15. For many of us, this will be the first time to see an absorbtion system in operation.

Hotel Industry Scheduled For Membership Drive

DURING the second quarter of 1954, all chapters will center their efforts on a membership drive within the hotel industry, it was announced by John T. Dabbs, national membership chairman, NAPRE. This industry has a very large representation among the present membership according to Mr. Dabbs.



John T. Dabbs

National membership chairman has pointed out that this industry, too, has produced some outstanding leaders for NAPRE. Two of the national past presidents, Erich B. Utescher, supervising engineer, Kirkeby Hotels, and John J. Bryner, chief engineer of the Roosevelt and New Orleans Hotels, are examples of the types of leaders developed by NAPRE. Mrs. Dabbs is of the opinion that the industry has many more prospects for leadership in the making, and a membership campaign during the second quarter may develop considerably more engineers of this calibre.

The national membership chairman recently reported a gain of 122 members for NAPRE during the first quarter of the fiscal year. San Francisco, Los Angeles, Colton, Stockton, Modesto and San Jose were the California chapters showing an increase in membership. Los Angeles alone had a 23 member increase; Chicago chapter had 10 new members in the same period and Detroit 9. Other chapters reporting new members were New Orleans, Twin Cities, Pittsburgh, St. Louis, Memphis, Dallas Rio Grande Valley, Seattle and Tacoma.

NAPRE Question Box

The National Educational Committee, NAPRE, answers monthly in this column, operating problems forwarded by members. The Committee appreciates answers from the field. Both questions and answers should be addressed to Prof. H. G. Venemann, 269 Littleton St., West Lafayette, Ind.

Power, Storage and Charges

MORE ON QUESTION NO. 985: How much frozen food as the general run can be placed in a plant containing one million cubic feet, being divided into two equally spaced rooms, having 23 ft. ceiling, being stored by fork trucks on pallets and having sufficient room for aisles?

ANSWER: In answer to this part of the question I must assume an average product density. It can easily be seen that a cubic foot of orange juice in metal cans would weigh more than a cubic foot of waffles wrapped in cellophane. Size and weight of pallets used and the need of pallet side racks to prevent crushing of lightly packaged products would be factors effecting the product storage density. A good overage product storage density might be taken as 10 lb./cu. ft. or 10,000,000 lbs. to be stored in 1,000,000 cu. ft.

With the proper insulation, this will require approximately 200 tons refrigeration. If the power rate is ¾ cents kw, what should the average annual power bill be for this part of the country (Eastern Seaboard)?

ANSWER: I will assume that ammonia is being used as a refrigerant, that a modern single stage, direct expansion system designed for high efficiency is to be built and that the storage temperature desired is to be around 0F. I presume the individual who asked the question is after a practical answer involving complete plant operation cost in regard to electric power bills.

The design of the plant I assume is of the modern single story type building currently being built for frozen food storage purposes. The number of doors opening to the outside contributes greatly to the refrigeration load. The need of frequent defrosting periods throws a large load on the compressors.

The question states that 200 tons of refrigeration would be installed. My guess is that only 100 tons of this capacity will be used normally based on approximately 5 psig suction pressure. The refrigerating plant should be designed to operate at an efficiency of approximately 2 bhp/ton. I would strongly urge oversizing the condenser to allow operation at lower head pressures. Ample capacity would then be available for expansion of the plant or increased loads.

When estimating power costs for a plant of this size one must consider other electrical equipment being used by the plant, such as charging batteries for fork trucks, lights, etc. Also in design and operation of plant facilities the motor selection for the refrigerating compressors must take into consideration the possibility of power factor correction and demand factor if these factors are used in computing the power bill. If consideration is given all these factors, experience has indicated the average plant power bill would be around $1500 to $2000 per month for a plant of the proposed size. However, it is commonly known the larger the plant the overall cost per unit decreases proportionately.

I would also like to know the freezer storage rate for this location and the handling charge?—W.H.B.

ANSWER: Cost of operation, location in relation to competitors, product density, size of lot, and size of packages are some of the factors effecting storage rates and handling charges. In the Midwest, storage charges range from about 61 cents per hundred pounds for waffles to 17 cents per hundred pounds for juices in metal cans. These charges are per month or part thereof. The handling charge is based on approximately 32 cents per hundred pounds — total charge in and out of plant.

The Eastern Seaboard is slightly higher; the South and far West are slightly lower. A more accurate idea of storage costs and handling charges could be obtained by sending for a copy of the tariffs put out by various storage companies in your area. It can easily be seen the only way one can go beyond a fixed minimum income from a storage plant and facilities is to have a rapid turnover of products. — Blanchard L. Sprunger (Member-at-large, NAPRE).

Hp Calculations for Horizontal Two-Stage

QUESTION NO. 991: Could you give me a procedure, set of rules or formula to follow in calculating the tons of refrigeration being developed by a two-stage horizontal reciprocating ammonia compressor? Specifically I am referring to a chart published on page 218, Principles of Refrigeration, 3rd edition (Page 189, 3rd edition revised). I can figure the tonnage accomplished by the low pressure cylinder, but when it comes to high pressure, I am stuck.—J.W.N.

ANSWER: The references given do not refer to a two-stage horizontal compressor, but to a multiple effect compressor. Since I do not know which one is bothering J.W.N., I will answer both.

Two-stage Compression With Liquid Intercooler

From manufacturer's data, get the true volumetric efficiency of 1st and 2nd stage compressors at the operating conditions.

If, p_c is the condensing pressure in psia, and p_l is the low pressure in psia, then p_m, the intermediate pressure should be

$$p_m^2 = p_c \times p_l,$$

Let w_l equal lbs. per min. of ammonia pumped by 1st stage compressor. Let w_t equal lbs per min of ammonia pumped by 2nd stage compressor. This includes w_l plus w_f (the flash gas from liquid intercooler), plus w_2 (any gas from other evaporators operating at pressure p_m). Usually w_2 is zero, and since w_f the flash gas has done no external refrigeration (only cooling its own liquid), all of the refrigeration is performed in the low pressure evaporators, and both 1st and 2nd stage compressors are required to produce a capacity equal to

$\frac{w_l (h_3 - h_l)}{200}$ tons, refrigeration; where

h_3 = enthalpy of NH_3 leaving low pressure evaporator

h_l = enthalpy of liquid NH_3 leaving intercooler

$$w_l = \frac{CFM \times E_t}{v_4}$$

CFM = piston displacement of 1st stage compressor.

v_4 = specific volume of NH_3 vapor entering compressor.

E_t = true volumetric of 1st stage compressor.

If the second stage compressor is handling some ammonia from other intermediate pressure coils, then w_2 lbs per minute must be considered as additional refrigeration.

The second stage compressor with liquid intercooler always handles more ammonia by weight than the first stage, but it never adds to the tons capacity of the first stage unless w_3 lbs per min are used to produce refrigeration at the intermediate pressure, p_m.

Multiple-effect Compression With Liquid Intercooler

In a multiple-effect compressor, each end of a horizontal double acting compressor, or both cylinders of a vertical single acting compressor, draws in vapor during the suction stroke; first from the low pressure evaporators, then when the piston approaches within five percent of the end of its stroke it uncovers a set of ports and permits additional ammonia from the higher pressure evaporators to enter the cylinder. On the return or discharge stroke this NH_3 vapor is compressed and pushed out into the condenser.

Let w_l equal the lbs per min pumped from low pressure evaporators, w_2 equal lbs per min pumped from high pressure evaporator, and w_f equal lbs per min pumped from flash tank.

As in the case of the 1st stage of a two-stage compressor,

$$w_l = \frac{CFM \times E_t}{v_4}$$

and tons capacity = $w_l (h_3 - h_l)$

$w_2 + w_f$ is found by subtracting w_l, the amount which had already come in from the low pressure evaporators, from the total lbs per minute, w_t, that will be in the cylinders at the higher suction pressure.

$$w_t = \frac{.95\ CFM \times .97}{v_5}$$

.95 CFM is the effective displacement; i.e., it is the displacement above the higher suction pressure ports.

.97 assumes a 3 percent loss in weight of gas due to port restrictions.

v_5 = specific volume of vapor entering cylinders from higher suction pressure evaporators.

$w_f = (1 - x)\ w_t$

x = quality of gas after throttling expressed as a fraction.

Having determined the values of w_l and w_2 the refrigeration capacity is computed in the usual way. — H.G.V.

Proper Evaporator Feed

QUESTION NO. 992: Which is better design and operation, to feed evaporator coils from top or bottom? (a) In a wall hung pipe coil with NH_3 refrigerant? (b) In a ceiling-hung diffuser unit with F-12? (c) In a tub-type freezer cabinet with copper tube soldered to inner steel tub? —J.S., Milwaukee.

ANSWER: I think that the feed to evaporator coils depends not alone on the refrigerant being used and the type or location of the coil, but also upon the arrangement of the coil, the type of expansion valve used and the coil's location with respect to the compressor.

In most cases bottom feed is preferred. All float valves use the bottom feed. Likewise most multiple-outlet thermal valves feed into the bottom. However, if a coil is designed to slope gradually from top to bottom in order to permit the oil to return to the compressor by gravity, then top feed is used. In most cases, however, the velocity of "Freon-12" through the coils is depended upon to carry the oil back to the compressor, so that gravity drainage is not too important. There is not much oil trouble with ammonia, so bottom feed is used in practically all cases— H.G.V.

Compressor Bhp from Panel Board Instruments

QUESTION NO. 993: How may I determine the amount of brake horsepower of my reciprocating compressor? Would a practical means of determining the brake horsepower utilize a watt meter, or a volt meter and ammeter?—W.L.T.

ANSWER No. 1: The brake horsepower required to drive a compressor is equal to the shaft horsepower of the motor, less any loss in the belt. The shaft horsepower of the motor is what the manufacturer calls *motor horsepower* or *motor output*. This may be determined by knowing the motor input as determined by a watt-meter or a watt-hour meter, and the motor efficiency. Motor manufacturers are able to furnish you with a table or a curve showing *motor efficiency* at variable loads, from no-load to full load and 25 percent overload.

For industrial 3-phase motors the efficiency curve is nearly constant from about half load to full load. Let us assume that during full load con-

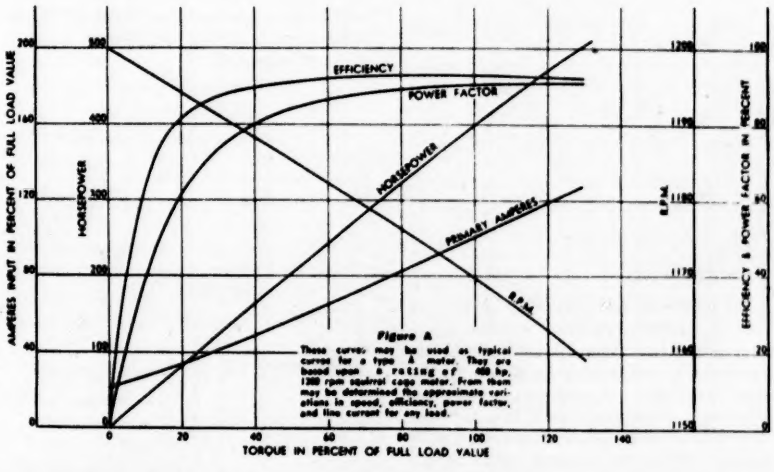

EFFICIENCY
POWER FACTOR
HORSEPOWER
PRIMARY AMPERES
R.P.M.
AMPERES INPUT IN PERCENT OF FULL LOAD VALUE
HORSEPOWER
R.P.M.
EFFICIENCY & POWER FACTOR IN PERCENT
TORQUE IN PERCENT OF FULL LOAD VALUE
Figure A
These curves may be used as typical curves for a type A motor. They are based upon a rating of 400 hp, 1200 rpm squirrel cage motor. From them may be determined the approximate variations in speed, efficiency, power factor, and line current for any load.

Fig. 1—Typical characteristics data furnished by motor manufacturers.

ditions your watt-meter read 40,000 watts, and the efficiency curve read 82 percent. The motor output would then be 32,800 watts. Since there are 748 watts in one horsepower, the motor output would be 43.8 horsepower. If the motor is direct-connected there would be no belt loss and the compressor horsepower would be the same as the motor output—H.G.V.

ANSWER No. 2: Power factor of a squirrel cage induction motor, like efficiency, is a motor characteristic which changes with the horsepower output. For this information on a particular motor hp and speed, consult the manufacturer. In general, the power factor for high speed cage motors changes from 90 to 84 percent as the output horsepower changes from full load to ½ load.

To measure the hp output proceed as follows:

Record voltage between any 2 of 3 phases.

Record current in amperes (panel-meter or tong tester). Note the name-plate full load amperes and you get a rough idea of the load from comparing with the ampere reading.

The formula for computing then is:

$$\text{Motor Shaft output hp} = \frac{1.73 \times \text{Volts} \times \text{Amps} \times \text{PF.} \times \text{Eff.}}{746}$$

Example: 125 hp cage motor, 1170 RPM, 3 phase, 60 cycle, 440 volt, Full load of 153 amps.

Measured: 454 V, and 115 A (roughly ¾ load)

Assume: PF = 87%

Eff. = 90%

$$\text{Hp} = \frac{1.73 \times 454 \times 115 \times .87 \times .9}{746}$$

= 95 hp at shaft.

For a synchronous motor, vary the exciter rheostat until the AC line ammeter reads at its lowest value. This is then 100% power factor.

The formula for determining shaft horsepower is still the same.

Example: 125 hp Synchronous motor, 360 RPM, 3 phase, 60 cycle, 440 volt, Full load of 134 amps.

Measured: 454 volts, and 100 amps (about ¾ load)

Power factor was set for 100%

Assume efficiency = 90%

$$\text{Hp} = \frac{1.73 \times 454 \times 100 \times 1.0 \times .9}{746}$$

= 94.5 hp at shaft. —J.R.W.

NH_3 Liquid Pump Vapor Binds

QUESTION NO. 994: Our plant has an ammonia receiver installed 18 inches off the floor in an old engine room over a buried exhaust steam line, still in use, which keeps the floor at a temperature of 125-150 degrees F. The accumulator and liquid section line are covered with brine thickness cork. The horizontal run of the liquid suction, which is 20 feet, pitches to the pump 18 inches and then drops the final 10 feet to a single stage pump. This installation worked satisfactorily up to 150 psig. discharge pressure. Above this pressure, flashing caused loss of suction.

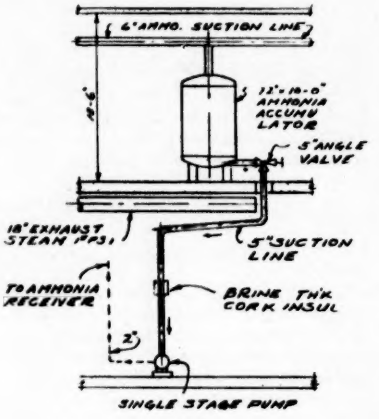


Fig. 1

We converted the liquid pump to two stage as it was necessary at times to pump against a discharge pressure of 225 psig. (Fig. 2.)

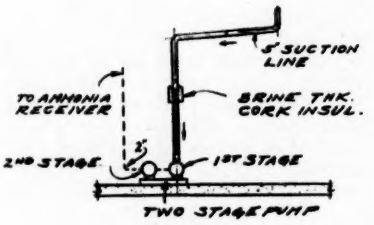


Fig. 2

However, flashing between first and second stage created more volume of vapor and liquid than the second stage could handle. The pressure then built up between stages and when it reached approximately 150 psig., the first stage lost suction, so we are right back where we started. What would your recommendation be? —A.L., Pittsburgh.

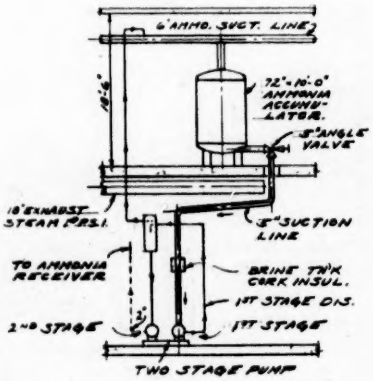


Fig. 3

ANSWER: We consulted the manufacturers of the equipment involved and it was decided to install a flash tank between the first and second stages and approximately ten feet above the second stage. (See Fig. 3.)

This tank was vented back to the accumulator through a ¾ inch relief valve set at 100 psig. This removed the vapor and provided vapor free liquid to the second stage. No further difficulty has been experienced. While this installation had several very undesirable conditions, they could all have been easily avoided at the beginning by elevating the accumulator to get desired head, and setting the liquid pump directly under it to keep suction line as short and straight as possible.—H.W. & A.L.

Cooling Concrete Mix

QUESTION NO. 995: Will you please furnish information as to the method of calculating the cooling load for cooling one cubic yard of concrete as placed in dams or foundations? As concrete sets or cures is there chemical heat developed and what is the specific heat of concrete? —J.W.B.

ANSWER: A comprehensive answer to this question appeared in two articles in Refrigerating Engineering. The first, page 534, Dec. 1947, by Clarence Rawhouser, Bureau of Reclamation, U. S. Dept. of the Interior, is basic and treats of the things which affect the "heat of hydration" during the hardening of concrete.

The second article, page 316, Oct. 1948, by Peter W. Mourer, Jr., and L. W. Kemmish, gives more information on this subject. The specific heat of concrete averages about 0.25 Btu per lb. per degree F. Therefore 1000 Btu must be removed to cool a cubic yard of concrete 1 degree F, or one ton of refrigeration should cool 12 cubic yards per hour.

There are too many factors which enter a problem of this kind to attempt a full discussion in this column. I believe the two references will give additional detailed information desired.—H.G.V.

New Questions

Air Desuperheater

QUESTION NO. 996: In my dairy plant, I have a maximum 150-ton refrigeration demand and sufficient compressing and evaporating equipment and only sufficient surface for 105 tons condensing, even with exceptionally cold water being returned from my cooling tower. I have been told that I can pick up the additional condenser surface by installing an air cooled desuperheater, ahead of my condenser. I am enclosing literature provided me. I would like to know if this is considered to be a good practical installation. The desuper-

heater installation is estimated at $2,000.00, whereas additional condenser surface is estimated at $6,000.00 to $7,000.00.—B.L.S.

Moisture Removal

QUESTION NO. 997: Would you advise a certain or sure way of dehydrating a refrigeration system employing low pressure fluorinated hydrocarbon gas as a refrigerant? — E.R.C.

Non-Freeze Solution

QUESTION NO. 998: In one of our plants, we have a modern evaporator coil which is continually defrosting by circulating a non-freeze solution over the coils. I have been asked time and time again by my employer if there is any way of preparing a more economical solution than the one we are now using. I have been unable to answer his questions. Have any of the Question Box readers had any experience in this connection?—G.K.

Salt-Ice Production

QUESTION NO. 999: Are there any machines designed and marketed in the United States for manufacturing ice from sea water? I am familiar with equipment produced by many large U. S. manufacturers and with the product produced by one firm using a eutectic solution to produce a salt ice. My application is to sea water, and cannot use the latter equipment.—E.H.

Capacitor Usage

QUESTION NO. 1000: Saw an article where an engineer installed a capacitor bank to reduce percentage of voltage drop in starting, thereby saving cost of rewiring and lost time for his employer. It was in connection with a fan for an air conditioning system. Seems they replaced 2-200 hp electric motor fans with a single 400 hp, 220 volt synchronous motor driven fan. Couldn't bring motor into step because of a 22 percent voltage drop on starting. A 135 *kvar*, 3 phase, 230 volt capacitor bank was installed. (a) Could you sketch a simple wiring hookup of such a capacitor bank? (b) Explain how it works? (c) What is a *practical* definition of that term *kvar*?—H.A.T.

Old Icebox Brings Fine

THE old refrigerator ordinance passed by the City Council of Portland, Ore., was used for the first time when Helen A. Hill pleaded guilty to leaving an old icebox outside unattended. Municipal Judge Philip Bagley imposed a $100 fine, which he suspended. Officers told the court that Mrs. Hill had two old iceboxes on the front porch of her home.

Frozen Food Distributors Expect Big Increase in Sales Volume

FROZEN food industry representatives attending the National Frozen Food Merchandising Convention and Exposition under the sponsorship of the National Wholesale Frozen Food Distributors Association at the Waldorf-Astoria Hotel, New York February 21-25 were unanimous in expressing optimism over the outlook for this year's sales volume. Last year was the biggest sales year yet for frozen foods. Sales this year according to the industry's marketing authorities, would run a comfortable 10 to 15 percent ahead of 1953. This would be in line with a growth rate that has been almost constant since frozen foods were first offered to the public on a large scale in the early 1930s.

Sales Doubled

Since then sales have doubled every four or five years. In recent years the growth rate has shown no tendency to slacken and, if anything, has been at a faster pace as more new frozen-food products were introduced and caught the fancy of the American housewife.

More than 243,000 retail stores now own zero display cabinets for the sale of frozen foods. In these stores, approximately five percent of all sales are in frozen products. The feeling in the trade is that within a very few years ten per cent of store sales will be in that category and there are some optimists who are talking of the day when the retail grocer will be doing 20 to 25 percent of his business in frozen foods.

The heaviest increase in sales in the future, it is agreed, will come from the highly processed "convenience" products, still largely in their infancy. The average frozen-food wholesaler now carries more than 300 frozen items in his inventory and does 80 percent of his business with 20 percent of these items. More than 20 percent of his business is done in three items alone—orange juice, peas and strawberries. Further gains in volume among these and other "fast movers" are expected as a matter of course.

Joint Convention in 1955

It is quite probable that the National Wholesale Frozen Food Distributors Association and the National Association of Frozen Food Packers will hold their 1955 convention simultaneously, according to association sources. Although final arrangements have not been completed, it is thought now that the meetings will be under separate sponsorship held in the same city and the same hotel and either meeting at the same time or one following the other. The distributors association has made a preliminary announcement that their convention will be held the week of March 13 at the Conrad Hilton Hotel, Chicago, Ill.

Frozen Sturgeon from Iran

THE Isthmian Steamship Line's Steel Voyager, arrived in New York recently with 24 tons of frozen Caspian Sea Sturgeon to initiate what is expected to be a regular commercial flow of this delicacy to the Port of New York.

The shipment, consigned to International Fisheries Co., will be sold to smokers and processors. Allen Sherman, president of the company, pointed out that fresh sturgeon has never moved out of Iran in quantities before and that establishment of this supply line raised many problems in refrigeration and transportation across hot countries.

Problems involved included rehabilitation of cold storage facilities at Teheran, arranging for refrigerated motor carriers and co-ordinating shipments by rail to tie in with Isthmian vessel arrivals at Khoramshahr. Eight of the line's ships can accommodate 30,000 cubic feet of refrigerated cargo each, while other ships in the fleet have 3,000 cubic feet each of refrigerated space.

Vegetable Committee Requests More Research

THE Vegetable Research Advisory Committee, concluding a 5-day meeting at Washington, D.C. February 12, reiterated its recommendation of last year that industry and other agencies outside government be encouraged to assume more responsibility for specialized and applied research in their respective fields. Established under authority of the Research and Marketing Act of 1946, the committee meets annually.

In marketing research the top recommendations were to expand (1) work on prepackaging of fresh vegetables, (2) studies on refrigeration of fresh vegetables in transit, and (3) studies on development and evaluation of improved and cheaper shipping containers for vegetables.

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IT PAYS to KNOW if the condenser pressure in your refrigerating system is higher than it should be because every 4 lbs. excess pressure raises power costs 2% and reduces capacity 1%. (Excess pressures of 15 to 50 lbs. are common.) In 9 out of 10 such cases air and other non-condensables in the system are responsible for this condition.

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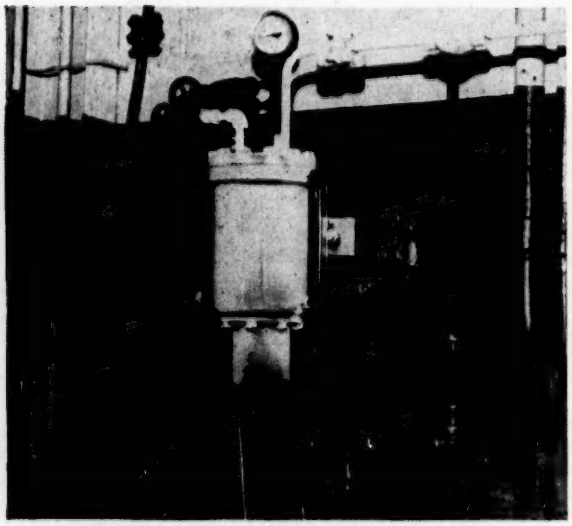

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Human Comfort Research Chicago ASRE Topic

ENVIRONMENT research and its relation to human health and comfort was the topic of Dr. Ford K. Hick, in his appearance before the Chicago Section ASRE, at the February meeting. Dr. Hicks, known for his work in this field, said that since Lavoisier had demonstrated animal heat had its origin in oxidation occurring within the body, there has been much study of the physiological means of dissipation of heat from the body surface by physical processes, and further study of the regulation of this production and heat elimination so that body temperature is held constant. Much of this work is laboratory research; some is practical research carried out under field conditions.

The work of Dr. DuBois must be mentioned, Dr. Hick asserted, because he particularly well separated the heat loss into parts lost by evaporation, radiation, conduction and convection in different environmental temperatures. The speaker explained that much of the field studies have had to do with what limits of heat exposure can be endured. It is recognized of course that man has no real adaptability to cold. He must be protected from cold by clothing or artificial heating. The "effective temperature scale" is an interesting approach at defining comfortable air conditions useful for the engineer. During World War II, Conn at Michigan studied processes of acclimatization to heat and demonstrated the role of the adrenal gland in this acclimatization process.

As a result of all this accumulated information, according to Dr. Hick we now look upon the body as a thermodynamic unit wonderfully adapted to maintain a fairly constant deep body temperature through the wide range of environmental temperatures, but requiring external heating or clothing to protect it from the cold. The sweating protects against heat.

In discussing work with which he was involved at the University of Illinois, Medical Department, Chicago, Dr. Hick said, "we have shown that moving healthy subjects in and out of hot rooms to comfortable rooms is without ill effect. The thermal adjustments are made promptly with the exception that upon the return to the comfortable room from the hot room, the variable amount of water trapped in the clothing leads to a variable time of adaptation or adjustment. Cardiac cases made this adjustment about as well as did the healthy subjects."

Previous to Dr. Hick's talk, Professor H. K. Fahnestock, an ASRE member, displayed slides of the environmental rooms and equipment in use both at the Medical Department, Chicago, and at the Champaign-Urbana campus. He explained briefly the complex system of duct work and machinery necessary to inducing temperatures and humidities required by the Medical Staff for their experiments.

New Warehouse for Packing House

A $150,000 refrigerated warhouse will be constructed by The Merchants Company at Hattiesburg, Miss., according to W. O. Tatum, chairman of the firm's board of directors. The new structure with a floor space of 11,000 square feet, will be used to house the meat and packinghouse division of the company's distributive business. It will be of steel construction with glazed tile.

The Merchants Company employs 175 people in its Hattiesburg operations and provides the city with a $500,000 annual payroll.

Patent Complaint Filed

THE installation of air-conditioning equipment in the Jefferson Building, Greensboro, N. C. has resulted in a patent infringement complaint against Jefferson Standard Life Insurance Co. and York Corp. Carrier Corp. of Syracuse, N. Y., contended in a complaint filed in Federal District Court that the Jefferson Building infringed upon patents granted Carrier's founder in 1944. York Corp. of York, Pa., was named defendant for allegedly selling or supervising installation of the units. Jefferson Standard, the complaint charged, used the systems, including Carrier's patented inventions, without consent.

An announcement by J. Keith Louden, vice-president and assistant to the President of York Corp. states that no details of the suit were available at the office of York Corp. He further stated that York Corporation's products and systems are only made available for sale after careful and thorough search of the patent art by competent counsel and they are confident that there is no basis for this suit. He said they intended to contest it vigorously and welcome this opportunity to have the matter tested in court.

FTC Charges Ice Cream Companies With Unfair Competition

THE Federal Trade Commission has charged eight major ice cream manufacturers and 55 subsidiaries with using "unfair methods of competition."

Accordingly, the F.T.C. issued complaints against the companies, which it said account for 40 percent of the ice cream business in the country. The major firms cited were National Dairy Products Corp., New York; Borden Co., New York; Carnation Co., Los Angeles; Fairmont Foods Co., Omaha; Pet Milk Co., St. Louis; Beatrice Foods Co., Chicago; Foremost Dairies, Inc., Jacksonville, Fla., and Arden Farms Co., Los Angeles. Their subsidiaries are scattered throughout the country.

The complaints contend that these companies follow practices in the sale and distribution of ice cream which have "a dangerous tendency unduly to hinder competition and create monopoly." The companies will have a chance to give their side of the controversy at hearings scheduled for April, May and June.

Arabs Build New Refrigeration Manufacturing Plant

ASSISTED by the Westinghouse Electric International Company, the Arabs will build and operate their first refrigerator and electrical appliance plant at Beirut Lebanon. The plant will start with production of household refrigerators in the spring of 1955 and eventually will turn out a full line of household appliances with a sales volume up to $6,000,000 a year, according to William E. Knox, president of Westinghouse International.

The company signed a technical assistance agreement with the new Middle East Electric Manufacturing Company, which will operate the plant. Funds for the project were supplied by private Lebanese and Egyptian capital.

Fishermen Build Ice Plant

CONSTRUCTION of a new plant with a 20-ton daily capacity is under way at the fishermen's co-op plant on the Westhaven Dock, Westport, Wash. The plant was expected to be in operation by March 15. The new installation will bring the total ice production of the Westport station and the Neah Bay station to 65 tons per day.

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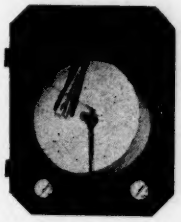

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TAYLOR INSTRUMENTS MEAN ACCURACY FIRST

Special Speakers will Highlight Annual AWA-NARW Coventions April 25-29

SENATOR George Smathers (D-Fla.) will speak at the opening general session of the American Warehousemen's Association 63rd annual meeting, according to W. F. Long, AWA general president. The meeting will be held at Boca Raton, Florida, April 25-29. It will be opened with a luncheon session at noon Monday, April 25.

Mr. Long, who is president of S. N. Long Warehouse, St. Louis, Mo., said that other speakers scheduled for the meeting include George S. Jones, executive director of the Air Conditioning and Refrigeration Institute, and Thurman Sensing, executive vice president of the Southern States Industrial Council, Nashville, Tennessee.

Since his election to the Senate in November, 1950, Senator Smathers has built up a reputation as one of the most active and promising young men in Congress. He is a member of the Senate Interstate and Foreign Commerce Committee, the Senate Small Business Committee, the Democratic Review Committee and the Interior and Insular Affairs Committee.

Mr. Jones, who will speak at the AWA All-Industry First Timer's Breakfast on Tuesday, April 27, is one of the nation's top salesmen—a past president of the National Sales Executive Club and former vice president in charge of sales for Servel, Inc. Mr. Sensing, one of the organizers of the Southern Association of College and University Business Officers and widely known as an author and analyst of political and economic trends, will speak at the AWA Farewell Luncheon on Thursday, April 29.

Good Meeting Expected

Convention Chairman John Mercer, president of Mercer-Fussell Company, Miami, Florida, reports "that this year's meeting will be one of the best on record, with almost 600 reservations received already." He pointed out that "convention programming is being carefully formulated to produce down-to-earth informative business sessions covering all phases of refrigerated and merchandise warehousing."

Meeting jointly will be AWA's two divisions, the National Association of Refrigerated Warehouses and the AWA Merchandise Division. NARW will hold two sessions in conjunction with the Refrigeration Research Foundation, at which two relatively new developments in the preservation of foods will be discussed, "Food Irradiation" and Jet-Air Freezing". Dr. Bernard E. Proctor of the Massachusetts Institute of Technology will discuss irradiation of foods as it relates to the future of the refrigerated warehousing industry and Edward Simons of San Francisco, California, will discuss the new jet-air freezing process.

Above: Front entrance to Boca Raton Hotel and Club. Below: Starting tee of Boca Raton golf course.

Panel Discussions

Arrangements for a customer panel, "The Customer Speaks," have been made for Wednesday morning, which will include representatives from most all of the warehousemen's customer industries. These customer panels always attract much interest and this year's discussion should be the best yet.

The lineup for "The Customer Speaks" will be as follows: Moderator, Watson Rogers, president National Food Brokers Association; Lawrence Martin, secretary-manager National Association of Frozen Food Packers; William Walsh, Morrison & McCluan Inc., Pittsburgh, Pa.; Dr. Wesley Hardenbergh, president American Meat Institute; Dr. Cliff Carpenter, Institute of American Poultry Industries; J. A. Podmore, Minute Maid Corp.; A. E. Huff, Birds Eye.

Other panel topics, tentatively being considered, include: "New Business For Refrigerated Warehouses"; "You Have To Sell It To Fill It"; "Warehousemen's Forum — Office Procedures, Warehouse Forms, Insurance, Housekeeping"; "Warehouse Losses—Damage, Pilferage, Claims, etc."; "Repair and Maintenance Problems"; and "The Latest In Materials Handling".

A highlight of the NARW sessions will be the awarding of safety certificates to individual plants who have gone one year, any consecutive 365 day period, without a lost time industrial accident. Only those records established after January 1, 1953, will count. The Safety Award Program was developed and sponsored by the NARW Safety Committee under the chairmanship of A. R. Carstensen, president of the Crystal Ice and Cold Storage Company, Sacramento, California.

Social Activities

The President's Reception and Dinner Wednesday night will highlight social activities. A Get-Acquainted Party, sponsored by warehousemen in the Florida area will open convention festivities Sunday evening and the Family Party will be held Tuesday evening. The popular Farewell Luncheon will be held Thursday noon.

To give delegates an opportunity to take advantage of the excellent recreational facilities available at the Boca Raton Hotel and Club, regular business sessions will only last a half day. However, special "Bonus Clinics" will be conducted in the afternoon for all AWA'ers wishing to attend. These will be general discussion meetings, covering a wide range of interest.

R. A. Robertson of the Fidelity Storage and Warehouse Company, Orlando, Florida, has been appointed chairman of AWA's "Golf Tournament", to be held either one or two afternoons during the week. Everybody will be welcome, 70 shooters and the duffers. There will also be a Ladies Tournament.

Exhibits

NARW Associate Members will be on hand also exhibiting the latest in equipment and services. Firms which have made reservation for exhibit space so far include the Armstrong Cork Company, Freezing Equipment Sales, Inc., Pittsburgh Corning Corporation, Carrier Corporation, International Insulations, Inc., Supreme Insulation, Inc., The Moto-Truc Co., and Refrigeration Engineering, Inc.

Post-Convention Cruise

Post-convention activities will include an Air-Cruise to beautiful and historic Havana, Cuba with arrangements being handled through the United States Travel Agency, Inc. In addition, delegates will have an opportunity to visit one or several of the concentrate plants in Florida. Snow Crop has agreed to run a special bus from Boca Raton to its plant in Dunedin, Florida Friday, April 30.

Loan Aids Expansion of Frozen Foods Plant

ARKANSAS Frozen Foods, Inc., of Little Rock plans to treble production through expansions made possible with a $150,000 loan approved by the Federal Small Business Administration. The federal agency at Dallas said the money would be used as working capital. The company, headed by R. C. Warren, has an average of 90 employees on its payroll. Organized last year, the firm froze blackeye peas and okra for the Birdseye Division of General Foods Corporation, Snow Crop Division of Clinton Foods, and Libby, McNeill & Libby. Equipment will be added to handle the increased output.

TRRF Plans Important "Workshop" Meeting

AN important part of the usual annual meeting of the Refrigeration Research Foundation will be held at the Edgewater Beach Hotel, Chicago, Wednesday and Thursday, April 21 and 22. This will be a "workshop" meeting with members of the Foundation's Scientific Advisory Council, members of the executive committee and board, project leaders, special technical guests, and in addition, a cordial invitation is extended to all who are interested in their indusry's technical progress. The two-day program will be entirely concerned with technical matters in commodity and engineering areas.

This Foundation Workshop at Chicago, it is expected will be very important for many members and for a specific purpose the thorough, comprehensive, detailed discussion of the research that has been made and is being made for the refrigerated warehousing and allied industries.

The Foundation Membership Meeting will take place in Boca Raton, Fla. in conjunction with the AWA-NARW convention Sunday, April 25 at 10:00 A.M. The Board of Governors will meet at dinner April 26.

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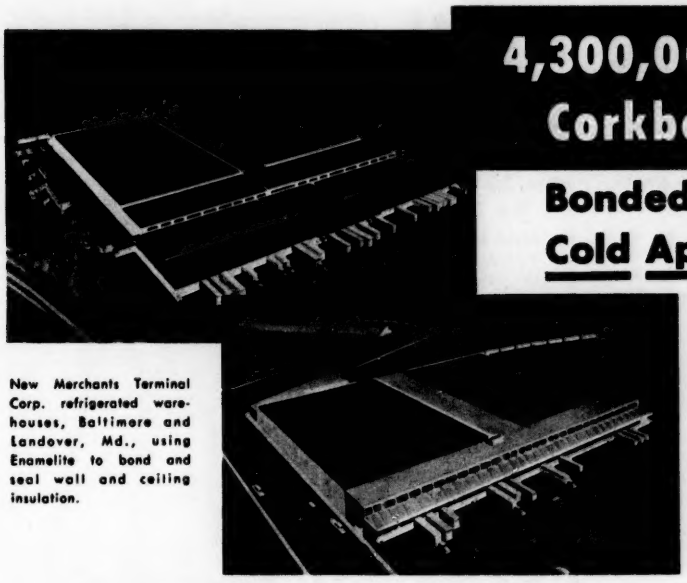


New Merchants Terminal Corp. refrigerated warehouses, Baltimore and Landover, Md., using Enamelite to bond and seal wall and ceiling insulation.

Insulation properly erected and sealed against moisture-vapor infiltration and freezing-thawing action will maintain its efficiency and last indefinitely.

That is why so many refrigeration engineers specify *cold applied* Enamelite No. 330 . . . proven by performance the most efficient, effective and economical material for erecting and sealing rigid, low-temperature insulation.

This cold applied asphaltic mastic maintains its volume constancy, develops a bonding strength of more than 100 lbs. per square inch, and forms a tight barrier against moisture-vapor infiltration.

A Presstite sales engineer will be happy to show you how Enamelite No. 330 can improve your cold storage facilities.

WRITE TODAY for new catalog and complete details on cold applied Enamelite No. 330.

Sealants, Adhesives and Coatings for automotive, Refrigeration, Construction, Appliance, Railroad, Aircraft, Communication and other industries.

PRESSTITE Sealing Compounds

PRESSTITE ENGINEERING COMPANY

3772 Chouteau Ave. St. Louis 10, Mo.

Simplified Practice For Retail Container Sizes

A PROPOSED simplified practice recommendation for retail container sizes (net weight) for frozen fruits and vegetables, has been submitted to frozen food packers, wholesale and retail organizations, and others interested in these products for comment or acceptance, the Commodity Standards Division, Office of Technical Services, the United States Department of Commerce, reported recently.

The proposed recommendation is based on a survey of industry practice with respect to container sizes by the Committee on Simplification of Containers of the National Association of Frozen Food Packers. The Committee's proposal for simplification is limited to the net weight of a selected list of 19 fruits and vegetables. The recommendation does not include the shape or dimensions of containers or specifications for the material of which they are made.

Mimeographed copies of the proposed recommendation may be obtained from the Commodity Standards Division, Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C.

Design Volume Data Book

THE completely revised and up-to-date (1953-54) edition of the Design Volume of the Air Conditioning and Refrigerating Data Book has been released and is now available, according to an announcement that has been made by the publisher, the American Society of Refrigerating Engineers.

This edition of the well known Data Book contains several completely rewritten chapters, as well as several new ones on the heat pump, absorption systems, steam jet units, and abbreviations and symbols. The volume consists of nearly 1,000 pages, including several hundred illustrations, tables, and charts covering the theory, principles, and basic engineering information needed in the design of refrigerating and air conditioning systems. Correlating the work of 49 outstanding authorities in the industry, the book is methodically indexed to provide easy reference to practical help on design, installation, and maintenance problems.

It may be obtained from the American Society of Refrigerating Engineers, 234 Fifth Avenue, New York 1, N.Y.—Price $7.50.

Amortization Available to Refrigerated Warehouses

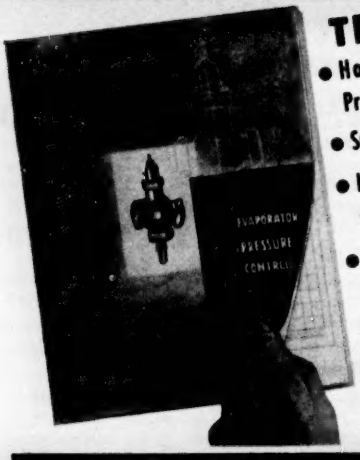
FAST Amortization is again available to refrigerated warehouses. Since December 3, 1953, refrigerated warehousing had been in a "suspended" category at ODM pending a review of possible expansion needs for refrigerated space. ODM reports this review indicates there are requirements (both civilian and military) for from 10-12 million additional cubic feet of refrigerated space in 1954 and 1955.

The procedure for filing for a Necessity Certificate remains the same, except that "Letters of Predetermination" are no longer required. Construction may be started immediately without prejudicing the application, although there is no guarantee the certificate will be issued.—Cold Facts.

Loading Platform Damaged

A STUBBORN fire caused about $10,000 damage to a loading platform of The North American Cold Storage plant, Chicago, Ill. A considerable quantity of shell eggs was destroyed. Cause of the fire was not known.

Just Off the Press!



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Four grate adjustments gives crushed ice from "pea-size" to 1½" chunks, by merely turning grate handle on side of hopper.

Galvanized for prevention of rust.

All-steel shell, legs and grate handle.

Belt driven, no gears, and self-aligning ball bearings.

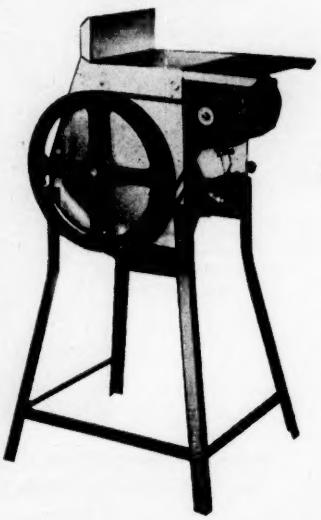
Chute for filling containers.

Safety-shelf for block ice to be placed before entering crusher.

Guard covers flywheel, belt and motor pulley.

Only $125.00 with ½ HP motor.

Bateman 25
CROWN
ICE CRUSHER



Write For Full Information
Bateman
Ice Processing Equipment
MINERAL WELLS TEXAS

Egg-Poultry Inspection Fees Increased

THE U. S. Department of Agriculture has announced increases in the supervisory and administrative charges for eggs and poultry inspection and grading service performed on a contract basis. The increases, which become effective April 1, 1954 are needed to cover the costs of performing these services and are a part of an over-all plan to make poultry grading and inspection service fully self-supporting.

Supervisory charges which are based on the volume of product handled in the plant will be increased in about the same proportion for shell eggs and poultry grading service and for continuous inspection of egg products processing operations. Charges for making plant surveys, and inaugurating continuous grading service in an official plant, also are increased.

The present administrative charge of $55 for grading a total of 8,000 cases of shell eggs during a month will be increased to $65; and the fee of $65 for grading a monthly volume of 500,000 pounds of poultry will be raised to $70. The charges for different volume brackets of product vary considerably, but the increases in this part of the total grading charge will amount to an increase in total fees and charges collected of about 10 percent.

Magazine Article on Refrigerated Warehousing

AN illustrated article "Warehousemen Chill Everything but Ideas" was published in a recent issue of The Nation's Business, pointing out the variety of items stored, and the growth of the industry, created by the increasing demand for more cooler and freezer space. Supported by references to many of the leading refrigerated warehousemen, it presents a good general picture of the industry.

Safety Award Program

TWENTY applications have already been received from refrigerated warehouse firms with accident-free records. Safety certificates will be awarded at the annual meeting in April to all firms who have gone one year, any consecutive 365 days, without a lost time industrial injury. The award program is being sponsored by NARW'S active safety committee—Cold Facts.

Consulting Engineers For Dallas Statler Hotel

MENTION of the firm of Jaros, Baum & Bolles, consulting engineers, 415 Lexington Ave., New York City, was inadvertently omitted from the article on the Dallas Statler Hotel Air Conditioning in the February issue of Industrial Refrigeration. This concern was consulting engineers for the installation and furnished information on the air conditioning for the article, for which appreciation is expressed.

Tyler Refrigerator Absorbs Companies

THE Tyler Refrigerator Corp., Niles, Mich., has absorbed two refrigeration companies previously operated as subsidiaries, it was announced by Robert Tyler, president of the firm. The Harder Refrigerator Corp. of Cobleskill, N.Y. and Wilson Refrigeration, Inc. of Smyrna, Del., will continue as divisions of Tyler, rather than as separate corporations.

Cold Storage Expands Space

THE Western Cold Storage Co., Inc., Moses Lake, Wash. has increased its capitulation to $300,000 for future expansion.

OHIO SPECIAL ICE CANS

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ICE CAN GRIDS

Industrial Trucks and Trailers

THE OHIO GALVANIZING & MFG. CO.
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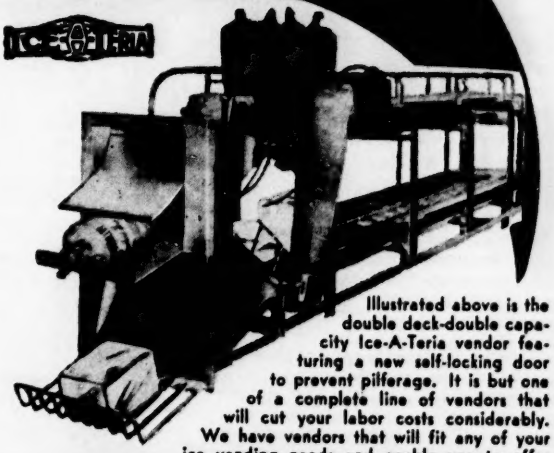
NOW READY TO SERVE YOU . . .



Illustrated above is the double deck-double capacity Ice-A-Teria vendor featuring a new self-locking door to prevent pilferage. It is but one of a complete line of vendors that will cut your labor costs considerably. We have vendors that will fit any of your ice vending needs and enable you to offer your customers 24-hour service.

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February 28 Cold Storage Holdings

PUBLIC refrigerated cooler space was reported to be 58 percent occupied on February 28 while freezer occupancy stood at 74 percent. Utilization of cooler space was above average for this time of year and was slightly greater than that reported February last year. On the other hand, national utilization of freezer space was not only less than the level reported a year ago but was also less than average for this date.

The total weight of United States food stocks held under refrigeration on February 28 totaled 4.2 billion pounds. This compares with 3.9 billion pounds in store a year earlier and 4.6 billion on hand last month. Cooler-held stocks were reduced to 1.7 billion pounds as a result of February net reductions in stocks of fresh fruits, vegetables, selected dairy, and meat products, despite significant gains in stocks of butter, frozen juices, and pork, February 28 food stocks in freezers fell off to 2.5 billion pounds as net withdrawals of fruits, vegetables, poultry, and selected meat products more than countered the reported net storage gains.

Apples still on hand February 28 totaled almost 11 million bushels, almost the same as the quantity on hand a year ago, while stocks of pears were under one million bushels.

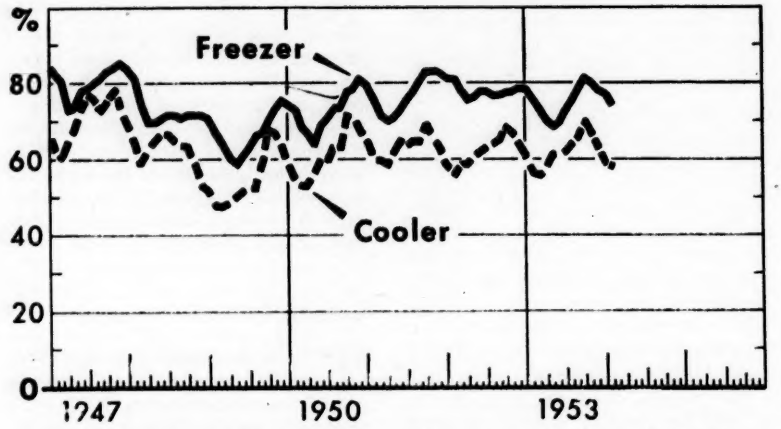
Country-wide stocks of frozen fruits were down 37 million pounds from the month before but total holdings of 291 million pounds still were the third largest on record for this date. Without exception, all frozen fruit items were in lesser supply on February 28 than the month before.

The net reduction in frozen vegetable stocks during February was more than one and one-half times the net disappearance this time last year and was more than two-thirds greater than average for February. Total frozen vegetable stocks of 561 million pounds compares with 450 million pounds in 1953 and 342 million pounds in storage February 28 during the 5-year average period.

Significant storage gains were reflected in holdings of frozen orange concentrate which totaled more than 23 million gallons by the end of February. The net increase of 6 million gallons compares with 4 million gallons last year at which time only 19 million gallons were in storage on February 28.

Net accumulations of butter during February brought national stocks up to 309 million pounds of which 273 million pounds were Government owned. The total was more than three times the storage stocks of a year ago and almost six times the average February 28 stocks. Approximately three-fourths of the U. S. stocks were almost equally divided between warehouses in the East and West North Central States while Middle Atlantic facilities held about 13 percent of the total stocks.

American Cheddar cheese holdings —399 million pounds—were almost unchanged from the previous month but still were at a very high level for this date. Current stocks compare with 187 million pounds a year ago and 145 million pounds on hand February 28 during the 5-year average period ended 1953.



End of month occupancy public cold storage warehouses 1947-1953

TABLE 1—COLD STORAGE HOLDINGS IN PUBLIC, PRIVATE AND SEMI-PRIVATE WAREHOUSES, APPLE HOUSES AND MEAT PACKING PLANTS (000 LBS.)

	Feb. 1954	Jan. 1954	Feb. 1953	Five Year Average
Beef	210,065	229,871	253,988	181,972
Pork	406,230	393,307	606,277	645,189
Other Meats and Meat Products	133,523	138,520	183,215	150,773
Frozen Poultry, lbs.	240,576	266,626	220,606	225,009
Creamery Butter, lbs.	309,040	294,047	99,557	52,309
American cheese, lbs.	398,594	397,990	186,776	145,439
Other cheese, lbs.	17,588	18,760	16,625	15,076
Shell eggs, cases	136	75	248	446
Frozen eggs, lbs.	40,830	38,244	42,419	53,497
Apples, bu.	10,646	14,943	10,775	12,639
Frozen fruits, lbs.	290,718	328,040	232,097	250,242
Frozen vegetables, lbs.	561,462	630,201	450,265	342,462
Frozen fish, lbs.	138,886	154,570	142,040	116,907

TABLE 2—PERCENTAGE OF SPACE OCCUPIED BY PUBLIC REFRIGERATED WAREHOUSES (APPLE HOUSES EXCLUDED)

	Net Piling Space (000 cu ft)		Feb. 1954 (%)		Jan. 1954 (%)		Feb. 1953 (%)		5-Year Average (%)	
	Cooler	Freezer	Cooler	Freezer	Cooler	Freezer	Cooler	Freezer	Cooler	Freezer
New England	2,867	7,307	36	78	38	81	30	68	44	76
Middle Atlantic	29,582	38,281	56	75	60	77	50	75	51	73
East North Central	26,873	28,967	63	85	61	87	62	84	60	79
West North Central	11,892	21,288	64	75	70	78	53	79	60	84
South Atlantic	9,867	13,762	58	68	59	68	61	81	56	80
East South Central	3,122	4,437	71	76	74	79	69	84	64	83
West South Central	8,742	10,816	62	59	62	60	73	74	64	64
Mountain	1,480	4,060	65	75	59	73	57	73	59	75
Pacific	16,534	31,672	49	66	50	74	59	69	52	66
United States	110,959	160,590	58	74	60	77	57	76	55	75

Poultry holdings were reduced to about 241 million pounds as February net reductions totaled 26 million pounds. This seasonal decline was less than the net disappearance last year and was also under the average net reduction for February. Turkey stocks totaled 109 million pounds by the end of February, a reduction of almost 16 million pounds from the month before. Stocks of turkeys in the Middle Atlantic and Pacific Coast States were almost evenly divided with each reporting more than 24 million pounds. However, total poultry stocks of 58 million pounds in Middle Atlantic facilities exceeded all other areas but was followed closely by East North Central States holdings of 53 million pounds.

Shell egg stocks were up to 136,000 cases by February 28 while holdings of frozen eggs were increased to almost 41 million pounds.

Stocks of frozen beef still were above average for this date despite a significant reduction, 20 million pounds, which brought holdings down to 201 million pounds. Frozen pork holdings were increased during February to almost 268 million pounds but these stocks were less than those on hand last year this date and also were less than the average holdings for February 28. Total pork stocks—406 million pounds—were only about two-thirds as large as the 1953 holdings and in addition were the lowest they have ever been on this date since 1947 as well as being the third lowest for any previous February 28 on record. Other meats in storage brought total U. S. meats and meat products up to 750 million pounds which compares with slightly more than one billion pounds in storage last year and average February 28 stocks of 978 million pounds.

Stocks of fishery products totaled 155 million pounds on February 28. Of this amount almost 139 million pounds were frozen fish and shellfish. Current stocks of fish in storage were approximately 4 million pounds under last year's holdings but were about 21 million pounds greater than average for this date.

Storage Outlook

National use of public cooler space on March 31 is expected to be at the occupancy level reported on February 28 or slightly under. It should mark the end of the seasonal downward cycle in cooler use which began late last fall. Freezer occupancy is expected to continue on its downward cycle and by the end of March should be at a level of 3 to 4 points under the current occupancy.

Colorado Cold Storage Enlarges Space

STORAGE premises of the Colorado Ice & Cold Storage Co. have been enlarged to a capacity of 2500 tons of commodities, enclosed within about 300,000 cubic feet of storage space.

L. L. Baker, general manager, who joined the firm last June after 25 years in similar work in Los Angeles, said also that the company is proceeding to convert approximately the same amount of presently unused space for similar refrigerated storage.

Cost of the first storage premises, Mr. Baker said, has been around $75,000. The second will be about the same and it was expected that the work will be completed by April 1.

Mr. Baker said that this convenience gives Denver a chance to offer stopping-off space for many kinds of refrigerated goods shipped either from east to west or from west to east.

Ice Company Chartered

A STATE charter has been issued to Holly Hill Ice Company, Inc., of Holly Hill, S.C. Colie Collins is listed as president of the firm which has a capital stock of $12,000.

Experienced

PIPE BENDERS, COIL BUILDERS, AND WELDERS

and the *right* equipment to build any form, of any metal up to 6-inch extra heavy—even stainless steel . . . *plus* 35 years' specialization, assures the finest quality custom work to your exact specifications!

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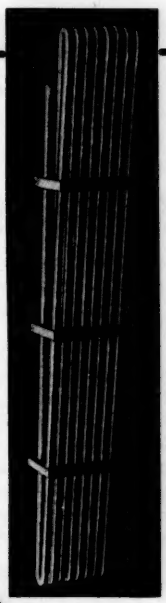

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Anhydrous Ammonia
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Please keep empty cylinders rotating.

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HENRY BOWER CHEMICAL MANUFACTURING COMPANY
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North Carolina Ice Convention

WITH an increase in attendance of more than 20 percent over last year, the largest since 1950, the annual convention of the North Carolina Ice Association was held at Raleigh, March 8 and 9.

Representing the National Association of Ice Industries, Wm. T. Jobe, general counsel, told about the current work of National Ice, and especially related it to the various unit ice associations.

One of the important addresses of the program was delivered by J. M. Jarrett, director of the Sanitary Engineering division of the state board of health on the public health significance of the manufacture and distribution of ice. Another feature was a talk by Micou F. Brown, vice-president and director of agencies of the Occidental Life Insurance Company.

Officers and Directors

Officers and directors were installed at the annual banquet held Monday evening as follows:

President, J. M. Freeman, Burlington

Vice-president, A. J. Brinson, Mount Olive

Secretary-treasurer, Lewis H. Powell, Raleigh

Executive Committee: L. G. Geddie, Mount Olive; V. E. Boomer, Rich Square; L. D. Gore, Morehead City; D. M. Howell, Greensboro; J. H. Lane, Charlotte; R. S. Sadler, Bayboro; George S. Sherrod, Greensboro; R. V. Sisk, Charlotte; Lawrence C. Rose, Wilmington.

Consolidated Ice Makes Final Report

WHAT is probably the final annual report of the Consolidated Ice Co., Pittsburgh, Pa., reveals that the preferred stockholders have received dissolution payments which now total $789,240.

President H. Stewart Dunn reports the company expects to go out of business as soon as it obtains a final settlement on its claim for damages, arising from the seizure of some property taken during the construction of Penn-Lincoln Parkway West. This property included silos and coal loading equipment, as well as some land. The company's claim is in litigation.

Consolidated Ice sold its manufacturing ice and delivery business to the City Products Corp. in 1950. Since that time, the company has sold all but one of its various properties. The company still has about 300 shareholders. During its 55 years in business, Mr. Dunn notes, the company paid them dividends totaling $3,180,000.

Consolidated Ice at one time had the capacity to produce 150,000 tons of ice annually. A predecessor company, Eureka Ice Co., built the first manufacturing ice plant west of New York, located at First St. and Duquesne Way. In addition to manufacturing ice, the company also did a large business at one time cutting and storing natural ice.

Canadian Ice Conference

THE Spring Ice Conference of the Canadian Association of Ice Industries will be held at the Royal York Hotel, Toronto, Ontario, Tuesday, April 6, opening at 10:00 a.m. with a morning and afternoon session. Both sessions will be the open forum type of program and will deal with problems of merchandising, sales promotion and advertising as applied to small cities and communities.

Safety Valves

Are the only ones to our knowledge, now approved by the National Board of Boiler and Pressure Vessel Inspectors for use with various refrigerants. Improved design allows Type AF Valves to handle two or three times as much gas as older valves. Seat and moving parts of stainless steel: ball joint distributes pressure evenly. Closes tightly after opening. Write for Bulletin 194 giving full data now.

DEPENDABLE REFRIGERATION SINCE 1882

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WAYNESBORO, PENNA. U.S.A.

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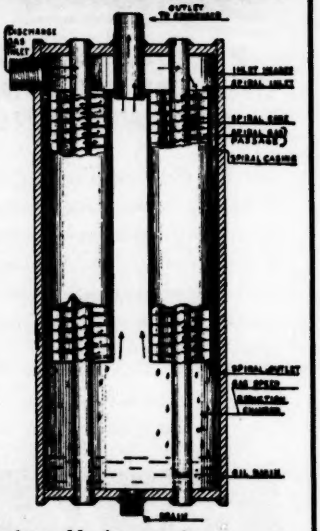
OIL SEPARATOR

STOPS OIL FROM ENTERING CONDENSER RECEIVER AND LOW SIDE



Allows operation as was originally intended. Simple in operation — no parts to wear out — no screens, metal wool or any close screens to clog, raise discharge pressures and cut down capacity.

When used in connection with air compressors, water is also separated with the oil.

Built for years of trouble free service. Mechanical details on request.

THE KING ZEERO COMPANY

4300-14 W. Montrose Ave., Chicago 41, Ill.

Pest Control — Losses to Industry Runs More than Billion Dollars a Year

SIDNEY BRIERLEY
Eastman Kodak Co.
Rochester, N. Y.

ONE of the most important functions of modern sanitation is pest control, which in turn calls for some knowledge of insecticides and rodenticides. I use the word "control" instead of extermination, and not without a good reason. Although insecticides have been known to the world for about three thousand years, we learn from good authority that no species of insect has disappeared from the earth because of man's activities; yet we know of birds and animals that have become extinct; and the toll would be much greater if it were not for the laws which are set up to protect them. (The opinions expressed herein are those of the writer and do not necessarily reflect the attitude or opinion of the Plant Maintenance Show or any company.)

Cost of Pest Control

I wonder if the average person realizes that the cost of pest control to industry runs over a billion dollars a year, and even in this era of inflation it still represents quite a staggering figure. Could it be possible that in the not too distant future we may have to double that amount? That is a startling thought, but who can say that it is fantastic? The answer lies in the practical application of the scientific studies which are readily available to all. We have a wide range of insecticides to choose from today. There are dusts, wettable powders, emulsions, solutions, and aerosols. Dusts can be applied in hand dusters, wettable powders as a paste or as sprays, emulsions and solutions also are sprays. Aerosol is a scientific term used to denote an insecticide smoke or fog, and usually dispensed from so called aerosol bombs.

All poisonous materials must be handled carefully; never lose sight of this fact. Although you may use them without any apparent ill effects, it is well to take simple precautions, such as using gloves; a pad respirator when exposed to spray mists or dusts; and, of course, goggles should be worn if there is the slightest possibility of harm to the eyes. Any insecticide which is toxic to insects is also toxic to man.

Address presented at Plant Maintenance Show and Engineering Conference, Chicago, Ill., January 25-28, 1954.

DDT Insecticides

In the 1940's the usefulness of D.D.T. as an insecticide became known in this country. Shortly afterwards wild claims were made regarding the effectiveness of D.D.T. It was used in the control of body lice during the second world war and was used extensively in the home, on the farm, and in industry for the control of the more commonly known insects. However, there were dark clouds on the horizon. In 1949 a survey conducted by the Illinois Natural History Survey disclosed that eighty-seven percent of the farms in Illinois were infested with D.D.T. resistant flies. A later survey in 1950 revealed the presence of D.D.T. resistance in all populations of wild flies that were tested. During the more recent Korean conflict D.D.T. resistant lice were found, and it became necessary to use pyrethrum or lindane instead of D.D.T. That brought out a very interesting fact. Although pyrethrum was first used in the United States in 1858, it was not until D.D.T. had failed to accomplish the desired results, that it was again considered as a first place insecticide.

Pest control is important to industry because the cost of such control added to losses from insects and rodents runs over a billion dollars a year. This is important money which should spark an effective control program in the hands of a competent man. It is especially important to food processing and refrigerated storage plants. A complete discussion of the problem is presented in this article, with comment on the various insecticides and how to apply them, and important points of a control program.

It is my honest opinion, based on over twenty-three years experience as a sanitarian, covering both the industrial and commercial fields, that as a contact spray, pyrethrum is still one of our best insecticides; and any complaint in connection with the ineffectiveness of a pyrethrum contact insecticide, upon thorough investigation, was found to be from poor application or insufficient dosage. Unfortunately, few persons use the proper dosage with the result that only too often the insecticide is unjustly blamed, when the desired control is not established. This is a most important factor in the breeding of tolerance or resistance in insects against insecticides.

Dosage Important

Anything less than a lethal dose can seriously retard our efforts towards establishing an effective insect control program. The successful use of a contact insecticide requires machine methods for generating an adequate amount of spray or fog. If you are in doubt about this, any reputable manufacturer of insecticides will be happy to send a representative around to discuss your problems with you. Take advantage of the many sources of information which are available to us today. Write to your Department of Agriculture or any state agricultural college; they will advise you as to the toxicity or effectiveness of insecticides of which you may be doubtful. There are twenty-two different kinds of insecticides listed as used by industrial plants, commercial buildings, housekeepers and farmers, so that the significance of using the correct insecticide to combat your particular problem is perfectly obvious.

Once this has been determined, the next function should be the formation of an operational control schedule. This could be carried out most efficiently by making a complete survey of all areas where insect infestation has been reported or may possibly exist. Insects and vermin thrive and flourish in filth, litter and dark, humid, and poorly ventilated areas. The method of garbage disposal should merit special attention. All garbage disposal areas and garbage receptacles should be kept clean by frequent washing. There never has been a substitute for good sanitation. It is generally much easier and definitely less costly preventing a condition from developing than it is to correct it.

With the information gained from the survey, a pest control program should be established. To be effective, definite frequencies must be maintained. The degree of infestation found would naturally determine this. Put

the actual operation in the hands of your most competent and conscientious man or men. See that they are properly trained in all phases of insect control. Stress the importance of cleaning after spraying an area, preferably by using a vacuum cleaner the contents of which should be burned when the cleanup is completed, thereby destroying the egg sacs along with any partially knocked out insects. Used with extreme caution a good residual insecticide could be most effective in insect control. However, as most residuals contain either chlordane or lindane, both of which are highly toxic, they should never be sprayed where food is stored, prepared, or served. In liquid form a residual could be mopped over a floor surface or brushed on walls or outside door frames. Again, the importance of intelligent application, which is the basis for effective operation in all instances, is to be emphasized.

Rodent Control

The problem of rodent control is similar in many respects to insect control. We must have a two-phase program, of which the first would deal with the preventive, and the second with the corrective phase. This is a tremendous problem and one that can only be solved by continuous effort. Unfortunately, it is impossible to build rodents out of all areas no matter what precautions may be taken. Thus we are faced with another problem of correction. Someone estimated that in this country each rat will eat or destroy property and food valued at about two dollars annually. Assuming that the rats number about the same as our human populations, and that could be a conservative estimate, you will readily appreciate the terrific load we are carrying.

To successfully combat and establish control of the rodents, we should be informed of their habits. Most all rats are nocturnal; they prefer to roam in a quiet darkened area where there is an abundance of food and water. The appetite of a rat is prodigious. An average rat will eat or ruin two-thirds as much mash as will a hen. A pair of rats will eat the equivalent of a one hundred pound bag of grain in a year.

The normal life span of a rat is thought to be about three years. They commence breeding when around three months of age, with a normal gestation period of twenty-one days. The male rats will eat the young if not protected by the female. Judging from the number of rats, the female must provide excellent protection. The young are born blind and helpless, but grow rapidly; their eyes open about two weeks after birth. The average weight of a full grown rat would appear to be less than a pound, but what they lack in weight, they make up for in cunning, and it is because of this that no method has so far proved to be infallible. It is a continuous battle of wits, and care must be taken to ensure a successful campaign against them.

Plan the Campaign

Any campaign against rodents should be started by making a survey of all infested areas. A rough floor plan could be drawn showing possible locations for bait stations; these are determined by the droppings, tracks in the dust, and other signs of infestation; a program should be designed accordingly. There are several methods of rodent control to choose from, such as locking, poisoning, gassing, or trapping. Speaking from my own practical experience, poisoning has proved to be the most practical and efficient method of control. The principal objection to poisoning is the possibility of objectionable odors coming from rodents that have died in conjested or confined spaces. However, a slow acting poison placed where rats or mice have access to and a good wick type deodorant can be used where odors are to be found.

Although there are a number of poisons on the market, the most effective rodenticide to date in my opinion is Warfarin. This, used in many different ways, mixed with cornmeal and a little peanut oil, or used dry with rolled oats, seems to be the most prevalent method. However, Warfarin may be sprinkled on pieces of melon, banana, fish, meat, cheese, or most any food the rodents show a preference for.

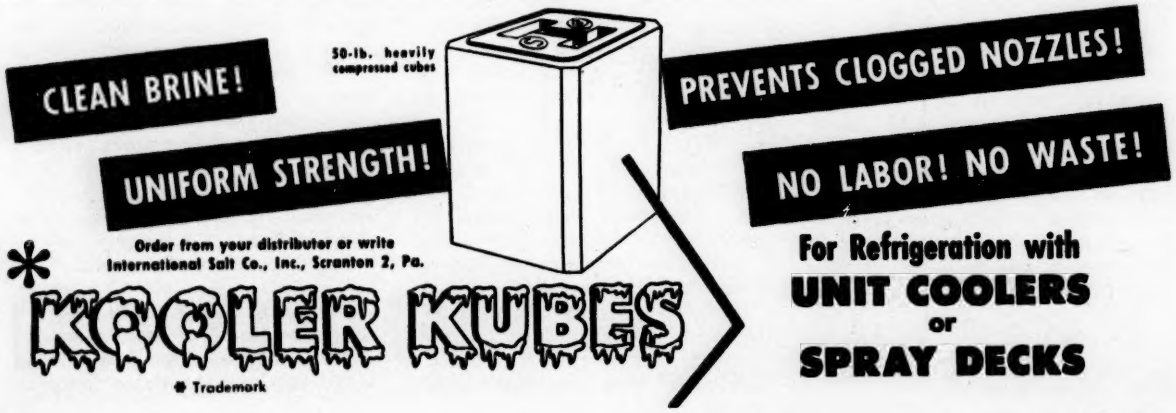
Warfarin Effective

Warfarin kills only when consumed repeatedly and produces no bait shyness. The word "Poison" should be marked on all bait stations. Any bait that becomes wet or mouldy should be replaced. All stations should be inspected at regular intervals and replenished when necessary until good control has been established. The number of stations may be reduced accordingly; it is always good policy to maintain one or two permanent bait stations where there is the slightest possibility of reinfestation. This, together with a periodic inspection schedule, will greatly aid in the control of one of the worst pests known to mankind.

Cold Storage Plant Expands

THE Completion of a two-story concrete building at Portland Ice & Cold Storage, Portland, Ore., will provide an additional 36,000 cubic feet of freezer space, Norman D. Savinar, vice president and general manager, reports.

The building contains two freezer rooms and provides concrete loading dock facilities for rail shipments. Refrigeration will be supplied by a blower system equipped with automatic temperature and humidity controls.



News of PEOPLE

JOHN K. DOZIER, a veteran executive of the Houston Terminal Warehouse Cold Storage Company, has been named president of the firm by the board of directors. Mr. Dozier, 52, succeeds the late T. M. Smith as head of the organization. He has been connected with the Houston-Terminal Warehouse & Cold Storage Company since 1928, and has served as vice-president for ten years.

Promotion to vice president of two other officials was announced. They are Leroy Machemehl, vice-president of shipping, and F. John Seyer, vice-president and plant superintendent.

WALTER H. LAPPEN has been named head of the quality control department in the frozen food division of Phillips Packing Co. Inc., Cambridge, Md. Mr. Lappen until recently was in charge of The U. S. Dept. of Agriculture office in Boston.

DR. WALTER V. PRICE, member of the Scientific Advisory Council, The Refrigeration Research Foundation and leader of a TRRF-aided project on frozen milk, has been elected president of The American Dairy Science Association.

HOWARD C. PIERCE, poultry research director for A & P Food Stores, has been named winner of the 1953 Industry Service Award, an annual award presented by the Institute of American Poultry Industries in recognition of outstanding leaders in the poultry and egg business. Presentation of the award was made at the Institute's annual Membership Breakfast, held in Kansas City February 14. Mr. Pierce has devoted his entire career to poultry, starting in 1907 as head of the first department of poultry husbandry at Iowa State College. He was one of the small group who founded the Poultry Science Association in 1908, and he served for nine years on the staff of the U. S. Department of Agriculture, in the Food Research Laboratory which formerly had been directed by the late Dr. Mary E. Pennington.

RAY D. FREE, manager of the Hygeia Ice Company, Salt Lake City, Utah, has been named chairman of a committee to draw up plans for celebrating the naming of Sugar House, a suburb of Salt Lake City, April 29. The event is being backed by the Chamber of Commerce and sponsored by Rotary, Kiwanis, Lions, Sons of Utah Pioneers, and the Sugar House Business and Professional Women's Club.

COL. HENRY CROWN, nationally known Chicago industrialist has been elected as a director of City Products Corp. Chicago, William J. Sinek, President of City Products has announced. Col. Crown is chairman of the board of directors of Material Service Corp. of Chicago, vice president, director and member of the executive committee of Hilton Hotels Corp., director and member of the executive committee of Chicago, Rock Island and Pacific Railroad Co., chairman of the board of the Empire State Building Corp. of New York City and a director of other nationally known corporations.

CHARLES W. PHILLIPS, a Port of Seattle employee for 29 years, has been appointed superintendent of the Salmon Bay Fisherman's Terminal. Mr. Phillips will succeed Edward P. Fitzgerald, who will retire May 1. He has been employed at the Bell Street Terminal for 20 years and has been superintendent there for the past two and a half years. Mr. Fitzgerald has been with the Port since 1933. He was superintendent of the Spokane Street ice plant before 1951.

JOE WHITMORE, long-time Executive Secretary of the Canadian Warehousemen's Association, will be leaving that position shortly to go into the public warehousing business.

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AUTOMATIC!
REFRIGERATED!
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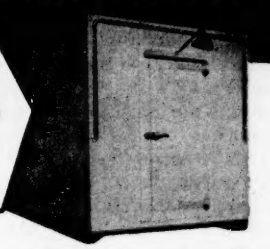

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Slash distribution costs . . . add frozen food profits for chain stores and super-markets!

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The POLAR Aluminum Ice Vending Station SELLS Cubed or Crushed Ice

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Each water conditioning problem requires individual analysis, individual solution. Wright Service is based on these facts. From first to last, we treat your water conditioning as an individual problem, starting with a laboratory analysis as the basis of a written proposal for the solution. Upon acceptance of our recommendations, constant checks are maintained to insure efficient, economical performance. If you have a water conditioning problem, get the Wright answer. Without obligation, write, wire or call for a survey by a Wright Field Engineer.

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Representatives: The C & S Equipment Co., 2103 S. San Pedro St., Los Angeles, Cal.
Mason Emanuels Co., 90 Dearborn St., Seattle 4, Wash.

American Service Reports Slight Increase in Profits

AMERICAN Service Company, operator of ice plants in thirty-five cities in the Southwest, reported net income for 1953 was slightly higher than in 1952. However, the earnings were, for the first time since 1949, sufficient to cover the full $3 dividend requirements on both the preferred and Class A stocks outstanding.

The continued reduction in the number of preferred shares outstanding, reflecting purchases and retirement, made more earnings available for the class A shares. The dividend requirements on 34,903 shares of preferred and 14,007 shares of class A stock totaled $146,730.

The 1953 net income was $148,370, compared with $147,286 in 1952, when the requirements on the two classes of stock totaled $163,308. Total revenues in 1953 were $5,775,837, against $5,660,764. Ice sales were $2,117,802, down 4.9 percent. Sales of other products were $3,658,035, a gain of 6.5 percent, notwithstanding a decline in appliance business of $182,523, or 19.3 percent. E. L. Gunn, Jr., president, said the company is faced with a shrinking ice market and the "management will continue to promote sales of other products."

The profit ratio available from sale of frozen foods and household appliances is materially lower than that obtained from ice. Accordingly, he said, it is necessary to obtain several dollars of sales of frozen foods and other products to replace each dollar of ice sales lost. The transition from the ice business is necessarily slow because of limited funds available for this purpose.

The report said that since its reorganization in federal court here twenty years ago, 43,272 shares of preferred have been retired or purchased for retirement, at an average cost of $43.60 a share. This represents 55.35 percent of the preferred stock issued at the time of reorganization.

Frozen Pies Remain Fresh

CONSIDERABLE progress has been made by John Jacobson, Worcester Cold Storage & Warehouse Co., Worcester, Mass., on the freezing of pies, according to a recent TRRF Bulletin. In 1953 the company froze 220,000 pies. Greater volume in 1954 is expected. Most successful pies have been squash, apple and mince. They are still unable, he says, to produce a berry pie that will defrost without a slight sogginess in the bottom crust. They are not wet and if the pies are preheated before use, they are perfect.

The secret, according to Mr. Jacobson, is to get the pies into the freezer immediately after they have been cooled sufficiently after removal from the oven. Pies are packaged in individual pie cartons (no window), each on a paper plate, without other wrapping. They are then packed in a master carton containing 30 pies. Master cartons are palletized 16 to a pallet (38 x 48) and each layer has four cartons. Dunnage is used between layers.

Best freezing results have been in a minus 20F forced-air system rather than anything colder. The pies are generally solid frozen in 18 hours. Room temperature defrosts the pies inside the cartons in about the same period of time. So far, there appear to be no significant condensation problems. They have frozen the pies at minus 5F with two 27-inch fans for added circulation, and results were good but freezing required 12 hours longer.

It is impossible to detect a difference between these pies and those that have been baked but a few hours, in Mr. Jacobson's experience.

Ice Checks Flower Blooming

BEFORE Holland Highway Express, of Delray Beach, Florida, solved the problem, all attempts to ship Florida gladioli to northern markets had met with failure. In warm weather, the bloomin' flowers kept right on bloomin' throughout the journey, and by the time they arrived up North, they were usually 'spent' and wilted. During the cold months, on the other hand, they would freeze and die en route.

The cold-weather phase of the problem was easy enough to overcome with the simple introduction of controlled 'lamp' heat into the cargo compartment of a truck, but the hot-weather situation seemed to be without an answer. Both mechanical refrigeration and dry ice had been tried, but both were too severe. Holland's approach to the problem was the use of pure ice—plain blocks of manufactured ice. So Holland's specially designed flower-transport trailers now have 3,300-lb. ice bunkers built into them, overhead and up forward, plus a battery of powerful blower fans to circulate ice-cooled, moist air throughout every inch of the interior. A temperature of 36 to 40 degrees can be maintained regularly with a complete change of air three times a minute.

The idea of ice-cooled and lamp-heated trailers has resulted in 5,000,000 extra payload miles per year for Holland Highway Express in its South-North shipments.

What about the return runs to Florida? They're fully accounted for, with no empty-return losses. Holland has sold its facilities as one leg of a truck-air express service from New York and Chicago to Central and South America, Cuba, Mexico, and the Dominican Republic. This 'by-product' of a South-North flower shipping business brings Holland in excess of a million pounds of truck-air cargo every month.—Dodge Job Rater (Dodge Trucks).

COMING CONVENTIONS

CANADIAN ASSOCIATION OF ICE INDUSTRIES
Spring Ice Conference
April 6, 1954
Royal York Hotel, Toronto, Canada
MILDRED E. CROFT, Exec.-Secy.

EASTERN STATES ICE ASSOCIATION
April 22-23, 1954
Lord Baltimore Hotel, Baltimore, Md.
GORDON T. WILSON, Secretary

VIRGINIA ICE MANUFACTURERS ASSOCIATION
April 22-23, 1954
Lord Baltimore Hotel, Baltimore, Md.
H. H. SNYDER, Secretary

THE REFRIGERATION RESEARCH FOUNDATION
April 21-22, 1954
Edgewater Beach Hotel, Chicago, Ill.
April 25-28, 1954
Boca Raton Hotel, Boca Raton, Florida
H. C. DIEHL, Director

AMERICAN WAREHOUSEMEN'S ASSOCIATION
April 25-29, 1954
Boca Raton Hotel, Boca Raton, Florida
WM. DALTON, General Secretary

NATIONAL ASSOCIATION REFRIGERATED WAREHOUSES
April 25-29, 1954
Boca Raton Hotel, Boca Raton, Florida
WM. DALTON, Executive vice-president

NATIONAL ASSOCIATION PRACTICAL REFRIGERATING ENGINEERS
November 2-4, 1954
Roosevelt Hotel, New Orleans, La.
J. RICHARD KELAHAN, Secretary

New DRY TAMP PERMAMix Floor Patch

Permamix-C for patching in temperatures from 5° above to 30° below zero.

DRY TAMP MEANS SPEED • No sticky mass to dig out of the drum or to handle • Permamix dry pours • sets instantly • feather edges perfectly • no production delays • non-skid surface.

ALL TEMPERATURE • Won't freeze • can be stored or used in any temperature • will store indefinitely • a stock room item • will not "set" in drum whether open or covered. Mistakes just can't happen. Tamp in place and traffic rolls.

CUTS MAINTENANCE COSTS on concrete, brick, tile or asphalt floors • no special equipment or skill needed • a one man job • comes in durable 50 lb. net wt. fibre drums • solve your floor patching problems for good.

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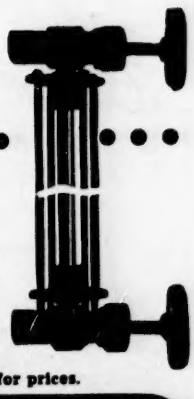

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See your jobber—or write us for prices.

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DEATHS

Zeb T. Osborne Killed in Automobile Collision

THE death of Zeb T. Osborne, assistant secretary and treasurer of The Colonial Ice Company, Greensboro, N. C. occurred suddenly February 18, resulting from an auto collision. Mr. Osborne's car skidded across the road into the path of another automobile. The driver of the car said he was meeting a truck when he saw Osborne's car come sliding from behind the truck into his path. Osborne had apparently driven too close to the truck he was following, slammed on his brakes and skidded into the left lane. Mr. Osborne, who was 49, leaves his widow Mrs. Eleanor Osborne and one daughter, Miss Joan Osborne of Greensboro.

THOMAS L. BUSH, for a number of years merchandising manager of the Henke Ice Service, Houston, Tex., died January 27 after suffering a stroke. He was 77.

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Charles Albin Anderson

THE death of Charles Albin Anderson, chief engineer, New Orleans Cold Storage & Warehouse Company Ltd. since 1919 occurred Wednesday, February 24. Born in Oland, Sweden, July 31, 1886, he arrived in the United States in 1903, was employed in the lumber industry in southern Mississippi, then railroading until 1912 when he was employed as oiler at the Cold Storage, advancing to position of engineer in 1917. He was employed as construction engineer by Charles F. Rantz from 1917 to 1919 when he returned to the Cold Storage as chief engineer.

Besides his widow, Mr. Anderson is survived by one daughter, Mrs. M. C. Galpern, Pensacola, Florida and three grandchildren. He was a member of the Presbyterian church of Kenner, of the National Association Practical Refrigerating Engineers, and a charter member and past-president of the Louisiana Chapter No. 2, N.A.P.R.E. He was a Mason 32nd degree and a Shriner.

George W. Day

THE death of George William Day, retired manager of the Union Ice Company at Chico, California, occurred at his home February 17. He was 56. Before coming to Chico, Mr. Day was manager of a number of Union Ice Company plants, including those at Watsonville, Vallejo and Redwood City. He is survived by his widow, four sons and two daughters.

WILLIAM ROBERT WEST, a resident of Dallas, Tex., for more than fifty years and who operated an independent ice company until seven years ago when he retired, died February 24. He was a former employee of The Clear Cold Ice Company.

DANIEL W. ROY, Oxford, Miss., owner of The Home Ice Company died February 14 of a heart attack while playing golf. He was 49. He was also owner of the Hi-Test Products Company, a director of the Bank of Oxford, a Mason and a Shriner.

DANIEL W. WOESTE who operated a coal and ice business in the West End of Cincinnati for more than 30 years until his retirement in 1950 died February 20. He was 76 and a Spanish-American War Veteran.

STAN BROOKS, Vice-president of the Minneapolis Terminal Warehouse Company and a member of the Executive Committee of the AWA Merchandise Division died Feb. 9.

HARRY T. FISHER, Refrigeration and Sales Engineer for the Henry Vogt Company in Dallas, died January 29, in a Dallas hospital. He was 68. He had lived in Dallas since 1932.

MANUFACTURERS' NEWS

Drayer-Hanson Provides Scholarship at Cal-Poly

FUNDS to cover a full four-year scholarship in air conditioning and refrigeration at the California State Polytechnic College at San Luis Obispo, Calif. have been donated by Drayer-Hanson Inc. Los Angeles, Calif. This full four-year scholarship leads to a B. S. degree in air conditioning and refrigeration.

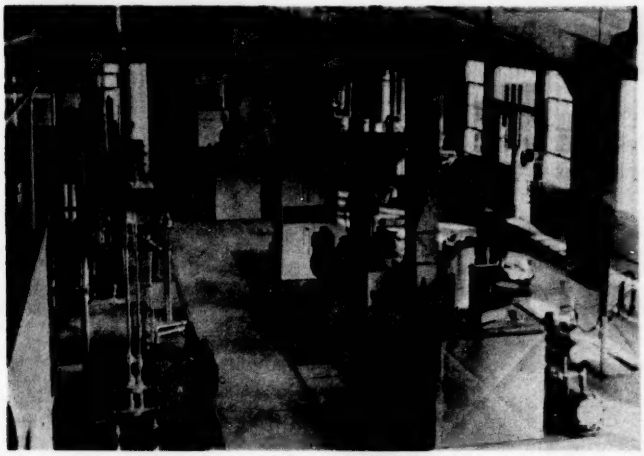
The first year will prepare the student to work for a heating and ventilating contractor. He may draft, estimate costs, install sheet metal ductwork or piping systems. The second year prepares the student to work as a heating and ventilating engineer for a manufacturer's agent, a contractor, or a consulting engineer. The third year prepares the student to work as a refrigeration engineer (i.e. for a food processing firm). He will plan, draft, estimate costs, sell, supervise construction and operate or inspect refrigeration systems for dairy manufacturing plants, meat packing plants, quick freezing plants, cold storage warehouses, transportation facilities, etc. The fourth year furthers his studies as an air conditioning engineer preparatory for working with factories, office buildings, theaters, stores, airplanes, etc.

Drayer-Hanson is currently greatly expanding their air conditioning and commercial refrigeration production, and with an established national sales organization, will now devote efforts (quoting Mr. Hanson) "To help develop the industry by assisting in the education and specialized training of promising young men." "Cal-Poly" is to actively solicit every school with emphasis on this full four year scholarship.

Mueller Furnace Merges With Worthington Corp.

AN agreement for transfer of the net assets, name and goodwill of the L. J. Mueller Furnace Company, to the Worthington Corporation, in exchange for Worthington common stock has been announced. A special meeting of preferred and common stockholders of the Mueller Company will be called to vote upon and approve the proposal.

Hobart C. Ramsey, president of the Worthington Corporation stated that the Mueller plant and facilities would be operated as the Mueller Climatrol Division of Worthington, and that the entire working force and management of the present staff will be continued in their present positions. The merger will unite two of the leading manufacturers in their



Above: Refrigeration Laboratory at California Polytechnic College.

Left: President Julian A. McPhee of California College receives scholarship check from Albert Hanson, vice-president of Drayer-Hanson. Also four Drayer-Hanson employees. Bill Keichline, Roy Graser, Jack Frazier, and Bob Bell.

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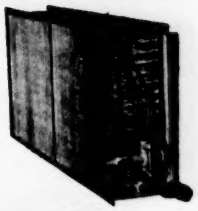
Rempe Coils are accepted in the industry as quality equipment that is built for long service without maintenance. Rempe Coils are used on the most difficult jobs and forgotten. This confidence has been earned the hard way—through proper engineering, good quality materials and precision manufacturing.

Coils and Bends of any metal or design engineered to your requirements. Send us your problems for engineering assistance.



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Mercoid DA-400 Series Pressure Controls incorporate a single bourdon tube which actuates two independently adjustable Mercoid magnet operated mercury switches to accomplish various circuit operations. For example:

1. Close one alarm circuit at high pressure and another at low pressure with both circuits open over operating range.
2. As an electrical interlock to open one circuit as pressure rises above and the second circuit as the pressure drops below operating range.
3. To provide two-stage control by opening or closing one circuit on a rise in pressure and the second circuit on a further rise in pressure.

Ranges 0-30" to 300-2500 psi

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THE MERCOID CORPORATION

respective fields—Mueller home heating and Worthington air conditioning. The full line of Mueller Climatrol products will continue to be manufactured at Milwaukee, Wis., and Worthington will continue to manufacture its air conditioning equipment at Holyoke, Mass., and Decatur, Ala.

Wachter Heads Sales For Freezing Equipment Sales

AN announcement by Henry B. Pownall, president of Freezing Equipment Sales, Inc., York, Pa., states that George R. Wachter has been elected vice-president and general sales manager of the company. Mr. Wachter has held managerial

George R. Wachter

positions in application and sales engineering for the York Corporation during the past ten years. He has been manager of sales engineering for the past five years and has been with York Corporation since 1935. Recently he directed and participated in a number of nationwide field surveys covering refrigerated storages and residential air conditioning.

Worthington Air Conditions Resort Hotel Wing

AN ORDER has been received by Worthington Corporation to supply the central refrigeration equipment to air condition a wing now being added to The Greenbrier in White Sulphur Springs, West Virginia. The 600-room Greenbrier, owned by the Chesapeake and Ohio Railway Company, is one of the outstanding year-round resorts in the United States and is the site of many large group meetings.

The new addition will have an auditorium with a capacity of 1,075 for meetings and 860 for banquets. A theater will accommodate 400. Both will have full stages with all facilities, plus the latest projection equipment and public address systems. Various sized smaller meeting rooms also are included. The Worthington equipment will deliver approximately 350 tons of cooling provided by a centrifugal refrigeration system with a 350 hp Electric Machinery Co. squirrel cage motor and gears.

Vending Installations

THE following companies have made installations recently of S & S ice vending equipment:

Herman Jarves Co., Philadelphia, Pa.
R. B. Whitaker Dist. Co., Mellville, N. J.
City Products Corp., Columbia, Ohio
Lawrenceville Ice Co., Bridgeport, Ill.
Fred Endsley Co., Robinson, Ill.
Inland Service Co., Charlottesville, Va.
New State Ice Co., Oklahoma City, Okla.
Bradley County Ice Co., Cleveland, Tenn.
City Products Corp., St. Louis, Mo.
City Products Corp., Pittsburgh, Pa.
J. S. West Co., Modesto, Calif.
Kenny's Ice Co., Decatur, Indiana
Southwest Service Co., Independence, Kansas
Valley Ice Co., Hamilton, Ohio
Karp Coal & Ice Co., Detroit, Mich.
Richmond Ice Co., Richmond, Va.

CATALOGS AND BULLETINS

Freeze-Drying in Industry

A BULLETIN "Freeze-Drying in Industry" has been issued by the F. J. Stokes Machine Co. Philadelphia, Pa. Industry is making wide use of freeze-drying techniques in the preparation of many products, so that they may be stored indefinitely without refrigeration. Besides the food processing industry, the medical profession uses a number of antibiotics and other products that are preserved by this process. The Bulletin explains that freeze-drying uses the technique of first freezing the product and then dehydrating it by controlled temperature. The Bulletin is attractively printed and well illustrated.

Du Pont Distributes Air Conditioning Articles

AIR conditioning of shopping centers, residences, printing plants, industrial buildings, and libraries, and use of refrigeration in modern food warehouses are discussed in the 1953 Air Conditioning Reference File distributed by the Du Pont Company's "Kinetic" Chemicals Division.

The file, fifth in an annual service series begun in 1949, includes short articles by Geoffrey Baker and Bruno Funaro of Howard T. Fisher & Associates, New York City; C. Warren Cheatham, engineering consultant of the Alabama Power Company, Birmingham, Ala.; James Mongitore and Fred L. Moesel, New York City consulting engineers; A. B. Waterbury, assistant chief engineer, Walter Kidde Constructors, Inc., New York City, and L. R. St. Onge, president of V. C. Patterson & Associates, York, Pa.

Folder Describes New Electric Fork Truck

THE Model F-39T10 electric powered, 10,000 lb. capacity fork truck is illustrated and described in a new folder released by The Elwell-Parker Electric Co., 4205 St. Clair Ave., Cleveland 3, Ohio. This truck has been designed to provide a heavy-duty machine capable of providing dependable and economical operation.

In spite of its large load carrying capacity the truck's overall dimensions and weight have been held within practical limits. In designing the truck, particular care was given to factors of accessibility for maintenance and repair.

The new literature is profusely illustrated and contains more than a dozen photographs showing the truck in a wide variety of applications, plus model shots and detailed views of components. Engineering drawings are also included. The folder lists complete design specifications.

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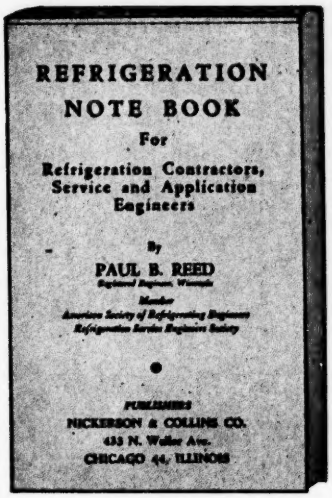
A Vest Pocket Book of Valuable Data REFRIGERATION NOTE BOOK

by PAUL B. REED



Vest Pocket Size—3¼ x 5 inches
204 Pages—Flexible Binding

THIS NOTE BOOK of condensed refrigeration information represents many years of work in accumulating practical data—"culling out" all extraneous material—so as the author states, "the reader will find a handy and easily carried source of information not usually kept in memory."

You will be surprised at the wealth of material that has been included in this convenient and practical reference Note Book. It is written in layman's language, without complicated formulas. In short, it is a tool responsible for the operation of refrigeration equipment.

$2.00 Postpaid

Nickerson & Collins Co., Publishers
433 N. Waller Ave., Chicago 44, Ill.

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Ice Plants, Ammonia Compressors, 3x3 to 12x12.
Condensers, coolers, ice cubers, scorers, cans.
Vee belts & pulleys, motors.
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All classified advertisements are payable in advance. Except for Positions and Help Wanted classifications, this section is reserved exclusively for USED equipment.

RATES: 20c per word; minimum 25 words. $2.00 per line for bold face headings. $15.00 per inch for line listings.

POSITIONS AND HELP WANTED

SALESMAN WANTED

We want a man who has faith in the future of the Ice Industry, with good character and integrity, to sell the best, most complete line of Ice Supplies in the U.S. Must be willing to travel, and own car. Established territory. This is a permanent position with opportunity for advancement and high earnings. Give full particulars in your reply to:

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ICE PLANTS—for sale

FOR SALE—Zenith 3 ton portable ice plant, with 10 ton motor and extra compressor for storage room. Operate at present location or move. Zenith Ice Co., Box 414, Garden City, Kansas.

FOR SALE—25 ton ice plant equipment complete and modern. Installed new by Frick Company in 1948. Perfect. Sacrifice. Dismantling plant. Ralph P. Jones, 3714 Commerce St., Dallas, Texas.

USED EQUIPMENT—wanted & for sale

FOR SALE—25 h.p. Westinghouse self-contained unit, Model LU 850 220/440, with controls. New June 1948. Make offer to D. F. Vater, The Cracker Jack Co., 4800 W. 66th St., Chicago 38, Ill.

WANTED—9x9 and 6x6 York ammonia compressors. Must be late type. Address Box AP-5, c/o Industrial Refrigeration, 435 N. Waller Ave., Chicago 44, Ill.

FOR SALE—One General Electric, 200 h.p. 220 volt, 3 phase, 60 cycle, induction motor. Model No. M 1197, type I-17, form M 488 amps, 197 secondary amps. Full speed load 580. Anderson Ice & Coal Co. Inc., 421 N.W. J St., Richmond, Ind.

FOR SALE—10"x7" Worthington booster compressor. 5x5 Frick, 7½x7½, 8x8 and 9x9 Yorks, splash lubrication. 3x3 self-contained York. 15 ton shell & tube condenser. Receivers, all sizes. Write E. Niebling, 1546 St. Clair, Mt. Healthy, Cincinnati 31, Ohio.

Don't try to compete with yourself by using that machine in your plant which is too small for the Job! Scan this page for the things you need and sell your small equipment through a want ad.

FOR SALE—COMPLETE ICE PLANTS

20 tons to 150 tons.

AMMONIA COMPRESSORS

12½x14½ York with 175 h.p. motor.
10x10 York direct connected to 100 h.p. syn. motor.
2—7x7 Fricks, V belt drive, 30 h.p. motors.
3x3 and 4x4 self-contained units.

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Link Belt crusher slinger—10 h.p. motor.
130 h.p. 3 cylinder Superior Diesel engine 600 r.p.m.; 50 h.p. motor 220 volts; 75 h.p. motor 720 r.p.m.; G. W. breaker elevator unit; ice cans, all sizes; blowers; air compressors, etc.

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"A" & Venango Sts. Philadelphia 34, Pa.
Phone GArfield 6-2221

FOR SALE—One U-Line scoring machine in real good condition; used only a few years. C. M. Rawlings, Holmesville, Nebr.

FOR SALE—9½x9½and 10½x10½ Vilter, York 7½x7½ with oil engine; 9x9 Frick with motors. 9x9 York slow speed, 10x10 York slow speed. Cranes, can fillers, condensers, brine coolers, crushers, cubers, scoring machine, raw water equipment, cans, agitators, blowers. Parke Pettegrew, 370 W. Broad St., Columbus 8, Ohio.

FOR SALE—A give away, just dismantled, 4 shell and tube condensers, 36x15', 10 gauge tube 2", 976 sq. ft. 3 shell and tube brine coolers, 30"x17" 10 gauge tubes, 784 sq. ft., all insulated. 1 liquid receiver 18"x12'-6". 2 generators, 4 absorbers, perfect condition. F.O.B. your truck at your own price. Conrad Hilton Hotel, Chicago, Ill., H. M. Toombs.

FOR SALE

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20 ton Ice Plant 240—300 lb. Ice Cans—4 Can Pull—Electric Driven
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85 ton Ice Plant 1040—300 lb. Ice Cans—26 Can Pull—Diesel Driven

AMMONIA COMPRESSORS

6x6 York Y-26	6x6 York Y-28
6½x6½ York Y-28	6½x6½ York Y-38
7x7 Frick type H	7½x7½ York Y-15
8x8 York Y-26	8x8 York Y-28
10x10 York Y-28	12½x14½ York Y-26

9x9 Frick type H capacity control D.C. 100 HP 360 RPM Syn. Motor
9x9 York Y-28 capacity control D.C. 100 HP 300 RPM Syn. Motor
10x10 York Y-16 D.C. 100 HP 200 RPM Syn. Motor
10x10 York Y-16 D.C. 70 HP 180 RPM Syn. Motor
10x10 York Y-28 D.C. 100 HP 300 RPM Syn. Motor

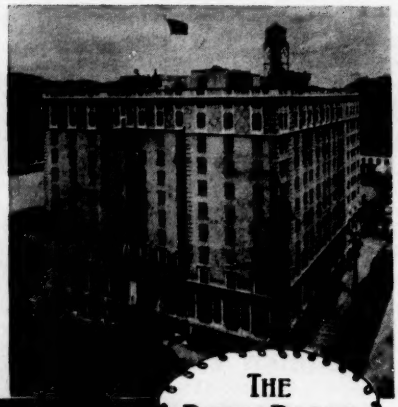
ICE CANS

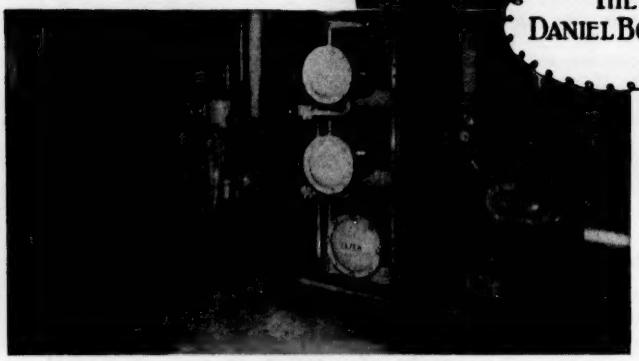
700 11x22x47" 300# Excellent Condition
100 11x22x51" 300# Excellent Condition
1000 11½x22½x44" 300# Good Condition
Shell & Tube Ammonia Condensers, Brine Coolers, Receivers, Traps, Valves & Fittings.
1—Miller Perfection Ice Scoring Machine
1—Link Belt Slinger with extra hoses—5 HP Motor
1—Gifford Wood Crusher—2 HP Motor

Write, wire or cable us on any equipment you need.

ENTERPRISE EQUIPMENT CORP.
77-79 Alexander St. Yonkers 8-8118-9
Cable Address: ENEQCO Yonkers, N. Y.

Looking for real satisfaction in REFRIGERATION ?





CHECK with VILTER

The Daniel Boone Hotel of Charleston, West Virginia, knows how good Vilter refrigeration is. In 1947, the Daniel Boone switched to Vilter and bought a Vilter twin cylinder vertical freon compressor.

In 1950, the Daniel Boone added a Vilter VMC eight-cylinder compressor.

In 1953, they added their third Vilter unit, another Vilter VMC eight-cylinder compressor.

In the process, the Daniel Boone has remodeled their equipment room to provide space for two more Vilter compressors, which they expect to purchase as replacement for other units.

It's pretty obvious that the Vilter equipment has cost less to maintain, has given less trouble, and that Vilter has followed through as usual with interest in the job that becomes greater, not less, after the sale has been made.

Vilter refrigeration and air conditioning can do as much for you. Better check Vilter!

Installed by **Commercial Refrigeration, Inc., Huntington, W. Va.**

Vilter

Your nearby Vilter Representative or Distributor will be glad to show you why so many Vilter users re-order Vilter every time.

REFRIGERATION and AIR CONDITIONING

THE VILTER MANUFACTURING COMPANY, MILWAUKEE 7, WIS.

Air Conditioning • Ammonia & Freon Compressors • Booster Compressors • Baudelot Coolers • Double Pipe Coolers • Blast Freezers • Evaporative & Shell & Tube Condensers • Pakicers • Pipe Coils • Valves & Fittings

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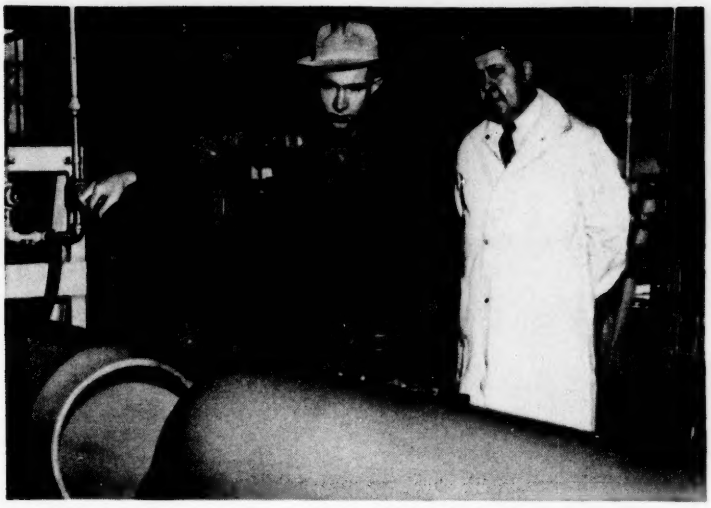
ARMOUR AMMONIA IS PRE-TESTED FOR QUALITY



Purity tests prevent "freeze-ups" and corrosion

Inspecting cylinder

Qualitative analysis

Checking the seal

Every 100- and 150-lb. cylinder of Armour ammonia must pass rigid tests before it's rushed to a customer. The empty cylinder is carefully inspected, painted, and filled with ammonia of 99.98% purity by test. As each cylinder is filled, the ammonia is subjected to an exacting qualitative analysis. Then the cylinder is sealed—your guarantee that your ammonia is just as it was when it left our plant.

These tests prove that Armour ammonia is pure, dry and free from non-condensable gases and oil. That's why our customers rely on Armour ammonia to prevent ice in evaporators, "freezing up" at expansion valves, corrosion and other damage. For dependable ammonia and service, call the Armour office nearest you—they're listed at right for your convenience.

ARMOUR *Ammonia Division*

Armour and Company • 1355 W. 31st Street • Chicago 9, Illinois

Wherever you are, there's an Armour office within reach of your telephone. So call and get acquainted with your Armour ammonia salesman today!

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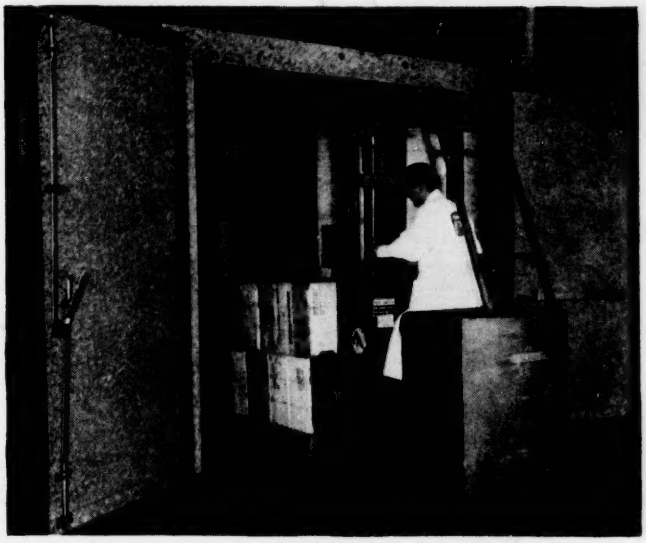
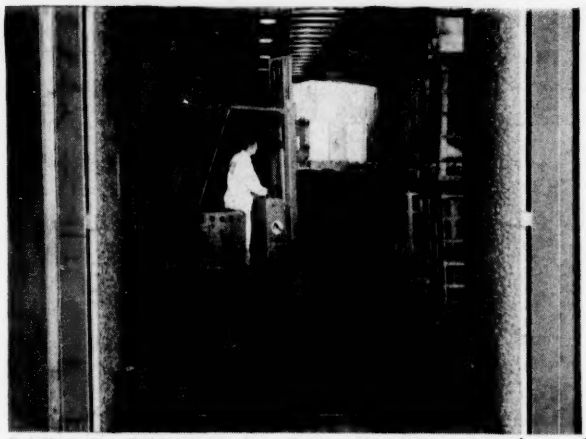


Heavily-Loaded Fork Lift Trucks are Able to Pass through the unusually large openings provided by the Double Super Freezer Vestibule Doors.

JAMISON Double Super Freezer Doors Open High and Wide to Speed Passage of Fork Lift Trucks at BEATRICE FOODS



To Minimize Refrigeration Loss During Handling, a second set of Auto-Close Doors (shown open for illustrative purposes) forms an air lock between each Super Freezer Vestibule Door and the storeroom proper.

One Man Can Open and Close the Huge Doors with ease because of the four Jamison designed ball-bearing hinges. A bump-open bar simplifies opening of the doors from the inside.

Five Jamison Double Super Freezer Vestibule Doors that open off the loading dock give the clearance needed for fast handling of frozen foods at the Denver Stock Yards Plant of Beatrice Foods.

Completely metal-clad, the doors resist weathering and the wear-and-tear of truck traffic. Patented Jamison interconnected two point fasteners assure a tight seal and combine with the unusual insulating efficiency of the doors to prevent refrigeration losses during normal operation.

There's a Jamison Door to fit your requirements, too. Consult your architect or write to Jamison Cold Storage Door Company, Hagerstown, Maryland, U.S.A.

JAMISON
HAGERSTOWN, MARYLAND, U. S. A.

More JAMISON Doors are used by *more* people than any other Cold Storage Door in the world.